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Montana Forest Insect and Disease Conditions and Program Highlights 2014

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MONTANA

Forest Insect and Disease Conditions and Program Highlights – 2014

Report R1-15-11

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Editor:

Chris Hayes, USDA Forest Service, Northern Region, State and Private Forestry, Forest Health Protection

Contributors:

Mark Casey, Gregg DeNitto, Joel Egan, Marcus Jackson, Blakey Lockman, Scott Sontag, Brytten Steed, and Nancy Sturdevant, USDA Forest Service, Northern Region, State and Private Forestry, Forest Health Protection, Missoula Field Office

Amy Gannon, and Brennan Ferguson, Montana Department of Natural Resources and Conservation, Forestry Division

Data Summary:

Scott Sontag, USDA Forest Service, USDA Forest Service, Northern Region, State and Private Forestry, Forest Health Protection, Missoula Field Office

Map Production:

Scott Sontag, USDA Forest Service, USDA Forest Service, Northern Region, State and Private Forestry, Forest Health Protection, Missoula Field Office

Cover Photo:

Lodgepole pine infected with lodgepole pine dwarf mistletoe, courtesy of Brytten Steed, USDA Forest Service, and Sporulating western gall rust, courtesy of Mark Casey, USDA Forest Service

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ABBREVIATIONS

The following abbreviations are used throughout this document:

Category	***Abbr.***		***Name***
Beetles	DFB	=	Douglas-fir beetle
	FE	=	Fir engraver
	PE	=	Pine engraver
	MPB	=	Mountain pine beetle
	RTB	=	Red turpentine beetle
	SB	=	Spruce beetle
	WBBB	=	Western balsam bark beetle
	WPB	=	Western pine beetle
Defoliators	DFTM	=	Douglas-fir tussock moth
	LCB	=	Larch casebearer
	PB	=	Pine butterfly
	WSBW	=	Western spruce budworm
Exotic Insects	BWA	=	Balsam woolly adelgid
Pathogens	LPPDM	=	Lodgepole pine dwarf mistletoe
	LPDM	=	Limber pine dwarf mistletoe
	DFDM	=	Douglas-fir dwarf mistletoe
	WLDM	=	Western larch dwarf mistletoe
	WPBR	=	White pine blister rust
Hosts	DF	=	Douglas-fir
	ES	=	Engelmann spruce
	GF	=	Grand fir
	LP	=	Limber pine
	LPP	=	Lodgepole pine
	PP	=	Ponderosa pine
	QA	=	Quaking aspen
	SAF	=	Subalpine fir
	WBP	=	Whitebark pine
	WL	=	Western larch
	WWP	=	Western white pine
Other	ADS	=	Aerial Detection Survey
	BLM	=	Bureau of Land Management
	FIA	=	Forest Inventory and Analysis
	FHP	=	Forest Health Protection
	FS	=	Forest Service
	MT	=	Montana
	NF	=	National Forest
	NP	=	National Park
	IR	=	Indian Reservation
	RA	=	Reporting Area
	RD	=	Ranger District

TPA = Trees per acre

*For a list of scientific names see Common and Scientific Names, page 52.

HIGHLIGHTS

- Mountain pine beetle continues to cause significant tree mortality in many high elevation five-needle pine stands. Most notable tree mortality was found in the Beaverhead, Flint Creek, Gallatin, Madison, and Beartooth Mountains.
- Mountain pine beetle-caused mortality in lodgepole and ponderosa pine was low across much of the state. It is still, however, causing extensive tree mortality in both ponderosa and lodgepole pine in some areas, most notably on the Bitterroot and Beaverhead-Deerlodge National Forests.
- Western spruce budworm defoliation increased in the number of acres affected from 596,000 in 2013, to just over 878,000 acres in 2014.
- Balsam wooly adelgid continues to damage subalpine and grand fir and has now been recorded by aerial detection survey. Its presence has been confirmed through ground surveys in Broadwater, Flathead, Gallatin, Granite, Lewis and Clark, Lincoln, Mineral, Park, Ravalli, and Sanders Counties.
- Root disease fungi are currently causing damage and mortality on nearly 3 million acres of National Forest lands in western Montana, while almost 8.5 million acres across all ownerships have some level of hazard from root disease.
- In northwestern Montana, larch needle cast was mapped on 16,556 acres and an unknown needle disease of ponderosa pine was mapped on 14,380 acres during the 2014 ADS. Most of these acres were in Lincoln County.

SUMMARY OF CONDITIONS

Bark Beetles

Mountain pine beetle

Mortality of pine species attributed to MPB was detected across the region in 2014, although most areas of past activity continue to decline in intensity. In landscapes with few remaining host trees, mortality was often found as scattered trees across a landscape. Some areas of significant mortality were noted including areas with increased mortality 10-15 years after the initial outbreak began. LPP remains the principal host and accounts for approximately 90% of all mortality detected.

In Montana, acres affected by MPB increased somewhat with more significant increases suggested by the total number of trees estimated killed. The Beaverhead-Deerlodge NF experienced over 2/3 of total mortality (acres and numbers of trees) within the state recorded for both LPP and high elevation five-needle pine (WBP and LP) host types. High mortality in LPP was also noted around the Lolo NF, and significant increases in high elevation five-needle pine mortality were found on the Gallatin NF. In PP, the Bitterroot NF continued to experience high levels of mortality with approximately 2/3rds of the acres and trees per acre of PP mortality detected in the state. Greatest decreases in mortality are indicated around the Lewis and Clark NF in all three host types. Some changes in mortality detected in 2014 are due to increased survey of the most active areas of MPB on the Beaverhead-Deerlodge NF, many of which had not been surveyed in 2013.

Douglas-fir beetle

Pockets of DFB-caused mortality in Montana were detected at similar levels in 2014 when compared to 2013. DFB-caused mortality was found on all land ownership types including federal, state, tribal, and private lands. Tree mortality occurred in spatially isolated pockets scattered throughout the state, and was often associated with prior WSBW-caused defoliation. Acres of DFB-caused mortality may be under-reported across Montana due to difficulties associated with detecting DFB activity in trees with prior defoliation. Of note, a DFB outbreak erupted on the Rocky Boy's IR in Chouteau County. This outbreak occurred following a severe wind event that blew down many stems infected with root and butt rot in 2011. Much of the Douglas-fir host type throughout MT has experienced severe WSBW defoliation for the better part of the last decade. This defoliation, if coupled with unusually warm and dry weather or another outbreak catalyst, could promote increased DFB activity in subsequent years.

Other Bark Beetles

Spruce Beetle: SB-caused mortality remained at low levels throughout Montana in 2014. In the two locations that had elevated activity in recent years, outbreak populations of SB declined sharply to low levels; these include federally managed lands within the Gravelly Mountains, Beaverhead-Deerlodge NF, and Rock Creek drainage, Custer NF. SB populations are not expected to erupt again as the prevalence of susceptible, large-diameter spruce host has been substantially reduced in these locations.

Pine engraver: PE populations and associated tree mortality continued at low, endemic levels in 2014, with total acres and number of trees estimated killed largely unchanged from 2013. Nearly all mortality was in PP as scattered spots across the Region. In Montana, over half of the PP mortality attributed to PE was noted in the southeastern portion of the state on the Crow and Northern Cheyenne IRs and Custer NF. PE beetle populations have remained fairly static throughout the state. If weather continues to provide near or above normal precipitation patterns and barring large areas of improper slash management, we expect populations will continue at or near endemic levels.

Defoliators

Area defoliated by WSBW increased over 45 percent in 2014 compared to 2013, to over 878,000 acres in counties both east and west of the Continental Divide. WSBW defoliation was recorded in most counties in which ADS was conducted and host trees occur. In 2014, defoliation intensity remained high in some areas, especially on forests east of the Continental Divide where WSBW has been recorded for several years. However, in most counties WSBW defoliation intensity decreased. Counties with significant WSBW defoliation include Flathead, Lewis & Clark, Missoula, and Powell Counties. This includes NF lands intermingled with surrounding lands of other ownerships.

No defoliation from DFTM, PB or LCB was recorded in 2014.

Exotic/Invasive Insects

Balsam wooly adelgid: BWA was detected on SAF or GF through ground surveys in Montana for the first time in 2010. In 2013, extensive ground surveys conducted throughout the state by Montana Department of Natural Resources and Conservation and R1 FHP found BWA in Broadwater, Flathead, Gallatin, Granite, Lewis and Clark, Lincoln, Mineral, Missoula, Park, Ravalli, and Sanders Counties. In 2014, BWA was observed for the first time by ADS. New detections being observed through aerial survey are likely due to aerial observers learning the visual signature and increases in tree damage that makes BWA easier to detect from the air.

BWA is an exotic pest that causes branch dieback and can cause tree mortality. The most obvious indicator of its presence is the white “wool” covered females on the bark of stems and branches of trees during summer months. To-date, BWA infections have been observed causing branch dieback and overall stress in host trees within Montana. Direct mortality caused by BWA has not been documented thus far in MT; however, we expect BWA infections to make trees highly susceptible to other mortality agents.

Root Diseases

Root diseases are diseases of the site and do not change drastically from one year to the next. Based on a recent assessment using USDA FS, FIA plots (http://www.fia.fs.fed.us), root disease fungi are estimated to cause damage and mortality on nearly 3 million acres of NF lands in western Montana. Root disease hazard, as derived from the FIA root disease data, occurs at some level on over 8.5 million acres in western Montana across all ownerships. Root disease-caused mortality is more common west of the Continental Divide. We currently do not have an

assessment of root disease distribution and impact east of the Continental Divide. In general, large areas of root disease can be found east of the Divide, but it tends to occur in more discrete patches rather than being ubiquitous throughout an area. Also, root diseases can be commonly found in riparian areas east of the Continental Divide, often in spruce and subalpine fir. The most impacting root diseases are armillaria root disease, laminated root rot, annosus root disease, schweinitzii root and butt rot, and to a lesser extent tomentosus root rot.

Foliage Diseases and Tip Blights

In northwestern Montana, larch needle cast was mapped on 16,556 acres. This is an overall increase from the 12,363 acres mapped in 2013, with nearly 90% of the 2014 acres mapped in Lincoln County. It was also detected in Flathead, Glacier, and Sanders counties.

An unknown needle disease of PP was mapped on 14,380 acres, with nearly 85% of it detected in Lincoln County. This unknown disease was also detected in Flathead, Lake, and Sanders counties. Field surveys will be conducted in 2015 to identify the disease.

ADS detected damage to PP attributed to both Elytroderma needle disease and western gall rust on 1,848 acres in Flathead and Lake Counties. Over 95% of those acres were scattered across northwest areas of Lake County.

Dwarf Mistletoes

Historical assessments of dwarf mistletoe stands in Montana show that about 16% of DF, 33% of LPP, and 30% of WL stands are infected with dwarf mistletoe. More recent assessments using FIA data collected on over 50,000 trees across Montana show that only about 1% of DF, 3.2% of LPP, and 3.9% of WL trees are infected. The clumpy nature and protracted disease-cycle of dwarf mistletoes allow for impacts across an individual stand to range from none to severe. This is likely the reason for differences between these two measurements; the first is measuring infected stands and the second is measuring infected trees.

White Pine Blister Rust

WWP, WBP, and LP are all susceptible to WPBR.

Western white pine

Mature WWP continues to be lost due to a combination of WPBR and MPB. Lack of suitable sites, either man-made or natural, limits natural regeneration, and WPBR kills a high proportion of natural seedlings. Rust-resistant stock is planted operationally on suitable WWP sites on federal, state, industrial, and private forest lands throughout northwestern Montana. In addition to planting rust-resistant stock, pruning of the lower bole at a young age is an important tool used in WPBR management.

Realized-gain trial: In the fall of 2014, personnel from the Montana DNRC assisted the Inland Empire Tree Improvement Cooperative (University of Idaho) with data collection on the Woodward Point WWP realized-gain trial. A realized-gain trial is a test of the actual gain of a breeding program, in this case the U.S. Forest Service's rust-resistance breeding program for

WWP where selected (rust resistant) materials are evaluated alongside non-selected (woodsrun) materials in operational field tests (Mahalovich 2010). The Woodward Point realized-gain study was established in 2012 and has a total of 6,600 WWP. Initial results from the 2014 measurement show a 96% seedling-survival rate. Only one tree had a definite WPBR canker, while a handful of others may be showing early bark reactions in response to infection. The next measurement will take place in 2016.

Whitebark pine

WPBR has been impacting WBP ecosystems since the 1920's. In addition, recent outbreaks of MPB have caused widespread mortality in many WBP stands already impacted by WPBR. The combination of WPBR, bark beetle outbreaks, and lack of natural regeneration due to fire suppression has raised concerns about the long-term viability of WBP ecosystems.

Standardized methodology is now being used to establish monitoring plots in WBP stands throughout the West. These plots are designed to provide a statistically-based assessment of the incidence of WPBR in the ecosystem and the condition of WBP. Whitebark and Limber Pine Information System, WLIS, is a database which was developed (http://www.fs.fed.us/r1-r4/spf/fhp/prog/programs2.html) to compile and provide results of surveys in both WBP and LP. WLIS has been expanded to include four other high elevation five-needle pines and has been re-named the High Elevation 5-Needle Pine Database (Hi5Db). It will be available soon as a live web-based system.

Limber pine

LP is found at elevations ranging from 2,700 feet near the community of Terry in far eastern Montana to around 9,000 feet in and around the Beaverhead-Deerlodge NF in southwestern Montana. West of the Continental Divide, LP is largely confined to limited areas adjacent to the Divide, while scattered populations of LP can be found across much of eastern Montana. WPBR is found throughout the distribution of LP, but there are a few areas where LP remains apparently free of the disease, including locations southwest of Ennis and south of Billings.

Unique damage

Pine leaf adelgid (*Pineus pinifoliae* Fitch) was identified as the causal agent significantly impacting several plantings of WWP in Lincoln County (MFO-TR-14-31). Damage was very reminiscent of WPBR branch cankers and included branch flagging; swollen branch ends; red needles much like a needle disease, except multiple years involved; numerous cohorts of red needles remaining attached; and resin droplets on affected branches.

Quaking Aspen Damage

QA damage is mapped occasionally by aerial surveyors when other damage activity is low and QA damage is striking. In most counties, total mapped acres in 2014 were well under 50. However, in six counties approximately 150 to 250 acres were mapped (Beaverhead, Big Horn, Madison, Meagher, and Teton), with nearly 1,600 acres mapped in Glacier County on the western edge of the Blackfeet IR. Based on past visits to scattered QA stands across the state much of this damage is likely due to old age (80-120 years is age of rotation for QA in northern

part of the western U.S.) and related fire suppression. However, conifer encroachment also plays a role where QA stands are mixed with evergreens.

Abiotic Damage

Windthrow damage detected by ADS has been similar over the last three years with about 245 acres detected in 2014. It was detected in Beaverhead, Flathead, Lake, and Sweet Grass Counties in 2014. Fifty-three acres of avalanche damage was detected in Powell and Teton Counties.

ANNUAL AERIAL DETECTION SURVEY

Aerial detection surveys are an overview assessment designed to locate and document forest change events, as seen from the air. It is a form of data collection that allows the observer to survey large tracts of forested land in a relatively short period of time. Single engine, high-wing aircraft flying at speeds of approximately 90 to 130 mph at an average altitude of 1,500 feet above ground level are used to fly either contour or grid patterns within a Reporting Area. The damage extents, or polygons, of the aerially detected signatures of recently killed or defoliated trees are marked on a digital sketch mapping system or on paper 1:100,000 scale topographic maps. These polygons are given a code for the agent that likely caused the damage, which is inferred from the size and species of trees affected as well as the color and pattern of the damage. The agent code is followed by the total number of trees affected, TPA affected, or an intensity of the damage (L for light and H for heavy). Areas burned by wildfire are not surveyed until the third year following a fire, as it can be difficult to distinguish mortality caused by fire from that caused by insect or disease activity. The actual amount of mortality from tree diseases, dwarf mistletoes, and WPBR are greatly underestimated with ADS because symptoms from these agents can be difficult and, in some instances, impossible to identify from the air.

The annual ADS in Montana was conducted from June 30 to September 26, 2014. The survey encompassed approximately 30.7 million acres of mixed ownership forested lands, excluding most designated wilderness areas (Figure 2). Four FHP observers, using three contract aircraft, conducted the 2014 ADS and identified approximately 1.5 million acres of forest damage within Montana.

The data summarized in this report are a product of the annual ADS, as well as ground surveys and biological evaluations. The digital data files, data summaries, and ADS damage maps are available from the Missoula FHP Field Office, in both paper and digital GIS format. Data may also be downloaded at http://www.fs.usda.gov/detail/r1/forest-grasslandhealth/?cid=stelprdb5182976.

INSECT AND DISEASE CONDITIONS BY COUNTY

County Results

For each county, damage by ownership is noted and, to the extent possible, we have indicated areas affected and estimated extent of damage. Counties that are not included had no reported information. Forestland data in the following tables are from the annualized surveys performed by USDA Forest Service, FIA (http://www.fia.fs.fed.us). In some of our tables acres of damage are reported for some ownership where there is no forestland reported by FIA. Because of the limited forestland within ownerships of some counties, the density of FIA plots may not have been sufficient at the county level to identify forested acres (i.e. forestland exists but was missed in the FIA sample resulting in an estimate of zero acres). This discrepancy is within their standard of error. Acres flown include areas of non-forest covered during the survey.

Beaverhead County

Forestland, Mortality, and Defoliation by Ownership (2,566,940 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	1,094,801	119,288	46,602	29,751	1,290,444
DFB	146	89	178	37	450
SB	76	0	0	2	78
MPB-LPP	236,010	3,168	7,396	645	247,219
MPB-PP	42	2	26	2	72
MPB-High Elevation	19,210	168	89	68	19,535
SAF Mortality	86	34	3	10	133
WSBW	6,139	19,682	3,438	3,349	32,608
QA Damage	14	89	54	0	157
Windthrow	92	0	0	0	92

Nearly all forested lands were surveyed in 2014 resulting in 50% more area surveyed over 2013. The majority of increase was due to full coverage of the Pioneer Mountains in 2014. Beaverhead County continues to be one of the remaining hot spots of MPB activity in the state. Significant levels of mortality were noted in LPP in the Beaverhead Mountains and western Pioneer Mountains, constituting not only a 50% increase in acres affected but nearly a four-fold increase in numbers of trees killed. The increase in area surveyed in 2014 accounts for much of this increase in detected activity, although density of mortality (i.e. trees per acre killed) also increased within polygons of MPB activity. The majority of mortality, as well as the greatest increase in mortality, occurred on Forest Service lands.

High elevation five-needle pine mortality also increased four to five-fold in acres and five to six-fold in numbers of trees killed from that detected in 2013. Mortality increased not only in areas that had experienced minimal mortality in the past (Pioneer Mountains), but also in areas that had significant mortality 5-10 years in the past (Beaverhead Mountains along the Continental Divide, Tendoy Mountains, Blacktail Mountains).

DFB activity in Beaverhead County was limited in 2013 to no more than 100 acres. A 4.5-fold increase in acres damaged by DFB (and >10-fold increase in number of trees) in 2014 was due, in part, to the increase in survey area. However, mortality increases were evident in areas

surveyed both years. The largest concentration of activity appeared in the northeast edge of the Pioneer Mountains, although mortality was present as scattered trees throughout the west and east Pioneers. Polygons of mortality were also delineated from Polaris south to Lemhi Pass, and southeast along the Continental Divide, as well as throughout the Blacktail Range. One strip of scattered polygons extended along the route into Mussigbrod Lake.

WSBW defoliation increased in 2014 over 2013 levels. A significant portion of acres were noted in the Centennial Mountains, but scattered polygons were detected in all mountain ranges including the Gravelly/Snow Crest/Greenhorn, Tobacco Root, and Ruby Ranges, as well as portions of the Madison Range, and areas between Glenn and Twin Bridges north of the Big Hole River.

Dwarf mistletoe, comandra blister rust, and western gall rust are impacting LPP in developed recreation sites along the Pioneer Byway (MFO-TR-14-43). ADS detected about a dozen polygons (from 2 to 45 acres) of QA damage in the southeast portion of the county totaling 157 acres. In addition, ADS detected a 92 acre area of LPP windthrow about 10 miles east southeast of Jackson.

WPBR is common in WBP in this county. In addition, LPDM is found here.

Big Horn County

Forestland, Mortality, and Defoliation Acres by Ownership (666,677 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	0	8,296	329,239	26,278	363,814
DFB	0	0	24	0	24
SB	0	0	2	0	2
MPB-LPP	0	0	18	0	18
MPB-PP	0	0	16	0	16
MPB-High Elevation	0	0	8	0	8
PE	0	10	732	10	752
SAF Mortality	0	0	4	0	4
WSBW	0	0	1,347	0	1,347
QA Damage	0	0	168	0	168

In 2014, aerial surveys were conducted in the Pryor and Wolf Mountains on the Crow IR and on areas of the Northern Cheyenne IR that lie within Bighorn County. Numerous scattered pockets of *Ips* spp.-caused PP mortality (ranging from 30-150 trees per group) were located throughout the eastern portion of the county within the Northern Cheyenne IR. Field assessments found a complex of Ips species causing the tree mortality. *Ips calligraphus* (six-spined ips) appeared to have caused the most mortality, while lesser amounts of PE and *Ips emarginatus* (emarginate ips) attacked PP as well (MFO-TR-14-21). This outbreak was triggered by severe drought conditions during the spring of 2012 and in early part of 2013. While geographically widespread, mortality was isolated to areas with dense stand conditions and marginal, dry growing environments. MPB activity that was identified in this area in 2013 may actually have been caused by this complex of *Ips* spp.

Small amounts of DFB activity and SAF decline were detected in the county as well. WSBW activity increased throughout the northern portion of the Pryor Mountains on the Crow IR, primarily within DF host.

LPPDM was found significantly impacting stands of LPP on the Crow IR in the Pryor Mountains (MFO-TR-14-26). WPBR is present in LP in this county. LPPDM and LPDM are present in this county. ADS detected 126 acres of QA damage about 29 miles south southeast of Billings and eight polygons (from 2 to 13 acres) of QA damage in the south-central portion of the county.

Blaine County

Forestland, Mortality, and Defoliation Acres by Ownership (59,255 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	0	74,871	56,036	4,579	135,488
DFB	0	0	28	0	28
MPB-LPP	0	0	29	5	34
MPB-PP	0	0	64	0	64
SAF Mortality	0	0	2	0	2
WSBW	0	0	15	0	15

The southwest portions of Blaine County where forested areas within the Fort Belknap IR occur were surveyed in 2014. Approximately 42% fewer acres were flown in 2014. Despite this, number of acres killed by MPB slightly increased in LPP but decreased in PP forests. DFB activity slightly decreased in 2014 and WSBW activity significantly decreased across the Fort Belknap IR.

Western gall rust and comandra blister rust are common in PP on the Fort Belknap IR causing stem deformities, branch mortality, top kill, and occasional whole tree mortality. Armillaria root disease is found on the Fort Belknap IR, in the Mission Canyon area, with large pockets developing in DF and QA. LPPDM is present in the county.

Broadwater County

Forestland, Mortality, and Defoliation Acres by Ownership (508,821 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	163,148	29,996	90,744	0	283,889
DFB	438	0	77	2	517
SB	4	0	0	0	4
MPB-LPP	14	0	2	0	16
MPB-PP	10	0	10	2	22
MPB-High Elevation	2	0	0	0	2
PE	0	0	2	0	2
SAF Mortality	10	0	0	0	10
WPB-PP	2	0	0	0	2
WSBW	11,588	0	335	0	11,923

Nearly four times the area was surveyed in 2014 as compared to 2013, accounting for most of the increased bark beetle and defoliator activity. Despite the increased survey area and damage agent detection, MPB activity was still under 50 acres total (all hosts), with SB, PE, WPB, and SAF mortality each no more than 10 acres of damage. The only damage agents with over 500 acres of activity included DFB (approximately 500 acres mostly on the Big Belt Mountains south of Diamond City) and WSBW (nearly 12,000 acres on the Big Belt Mountains north of Diamond City). Very little change in damage agent activity was noted in the southern Elkhorn Mountains that was surveyed in both years.

Stem decay, as well as root and butt rots, are concerns in hardwoods and conifers in Skidway Campground (MFO-TR-14-10).

WPBR has been found in LP in this county. Armillaria root disease is present, and schweinitzii root and butt rot is quite common, especially causing significant decay in butt logs of larger, older DF. LPPDM is also present in this county.

Carbon County

Forestland, Mortality, and Defoliation Acres by Ownership (327,480 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	170,199	89,996	44,890	6,188	311,273
DFB	204	27	87	11	329
SB	16	0	2	0	18
MPB-LPP	564	3	432	267	1,266
MPB-PP	24	2	5	0	31
MPB-High Elevation	2,163	4	8	0	2,175
SAF Mortality	218	0	0	0	218
WSBW	76	0	29	0	105

Aerial surveys primarily occurred within non-designated wilderness areas of the Beartooth Mountains in the western portion of the county near Red Lodge and within the Pryor Mountains in the southeast portion of the county. In the Beartooth Mountains, MPB activity increased within LPP and WBP. Ground surveys indicated pockets of mortality were widespread and ranged up to 30 stems per group in the Hellroaring Gulch area and up to 100 stems per group throughout the Rock Creek drainage (MFO-TR-14-21). The SB outbreak that occurred within the Rock Creek drainage in recent years has subsided. Small, scattered pockets of MPB in LPP and DFB were detected in the southern Pryor Mountains on the Crow IR in the eastern portion of the county.

Spruce broom rust and tomentosus root disease in ES are prevalent in various campgrounds in this county. WPBR is common in WBP and LP, and LPPDM and LPDM are present in the county.

Carter County

Forestland, Mortality, and Defoliation Acres by Ownership (249,029 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	65,752	0	37,515	0	103,268
PE	31	1	18	0	50

In 2014, aerial surveys were conducted on the limited acres of forested land in Carter County near Ekalaka. In this area, small pockets of PE activity were observed in PP.

Cascade County

Forestland, Mortality, and Defoliation Acres by Ownership (492,908 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	182,999	26,439	94,601	14,143	318,182
DFB	130	7	59	8	204
SB	8	2	2	2	14
MPB-LPP	998	2	42	2	1,044
MPB-PP	12	2	42	0	56
SAF Mortality	14	0	0	0	14
WSBW	38	709	4,257	846	5,850
QA Damage	0	0	43	0	43
Unidentified Defoliator	0	1	5	0	6

Area surveyed within Cascade County was nearly identical in 2014 and 2013, and included the northern portions of the Big Belt and Little Belt Mountains, and the southwest corner of the Highwood Range. Mortality due to MPB continued to drop in all hosts, often with a five to 10-fold decrease or greater. The approximately 1,000 acres of LPP mortality was almost exclusively in the Little Belt Range between Monarch and Neihart. Some increased mortality was detected for DFB to over 200 acres; most as scattered trees across the Little Belt and Highland Mountains. Defoliation by WSBW also increased to over 5,850 acres, almost entirely noted on the Big Belt Mountains.

Elytroderma needle disease, a rare occurrence on LPP in Montana, was found on LPP in Aspen Campground (MFO-TR-14-15). LPP regeneration in Many Pines Campground is affected by western gall rust and LPPDM and is expected to be highly impacted if adjacent overstory is left untreated, while spruce broom rust is having a large impact on ES regeneration in this campground (MFO-TR-14-15). ADS detected a total of 43 acres of QA damage in four polygons (one in southwest corner, two in southeast corner, and one along east central edge of county).

WPBR is common in LP in this county. Armillaria root disease is present in the southeastern portion of the county, and schweinitzii root and butt rot is quite common, causing significant decay in butt logs of larger, older DF. Tomentosus root rot is known to occur in several areas, including Kings Hill Campground.

Chouteau County

Forestland, Mortality, and Defoliation Acres by Ownership (222,644 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	13,289	10,273	33,979	1,338	58,880
DFB	43	2	271	0	316
SB	4	0	2	0	6
MPB-LPP	58	0	2	0	60
MPB-PP	0	2	4	2	8
WSBW	0	12	305	0	317

In 2014, forested areas in the Highwood Mountains and on the Rocky Boy's IR were surveyed, similar to what was surveyed in 2013. MPB-caused LPP mortality declined substantially within this area after being elevated in recent years, and typically occurred only within drainage bottoms. DFB activity increased substantially within the Rocky Boy's IR, especially in stands

near Bailey Peak and within the Sandy Creek drainage. Numerous green-infested trees were detected in these areas through ground surveys indicating populations are increasing (MFO-TR-14-19). This outbreak started following a severe wind event that blew over numerous trees in areas known to have DF infected with schweinitzii root and butt rot. Trees impacted are generally the older, large-diameter stems (exceeding 15" DBH).

Defoliation caused by WSBW persisted at very low levels in 2014 after a dramatic reduction in 2013.

Armillaria root disease was found in several locations in the Big Sandy Creek drainage (MFO-TR-14-40). Armillaria root disease is present in various locations on the Rocky Boy's IR, but appears to be uncommon. Also, butt rot and stem breakage caused by the decay fungus *Ganoderma applanatum* (artist conk) has been observed in QA on the Rocky Boy's IR.

Deer Lodge County

Forestland, Mortality, and Defoliation Acres by Ownership (445,390 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	202,800	6,404	34,386	41,855	285,447
DFB	820	13	193	12	1,038
SB	0	0	6	2	8
MPB-LPP	13,234	111	1,400	4,264	19,009
MPB-PP	3	0	3	0	6
MPB-High Elevation	797	0	971	22	1,790
SAF	2	0	0	0	2
WSBW	31	0	0	0	31

Significantly more acres were flown by ADS in 2014 versus 2013. The majority of tree mortality in the county was caused by MPB. Number of acres killed by MPB and the intensity increased by 10-fold in LPP, remained at low levels in PP, but increased in high elevation five-needle pines especially along the northern border. MPB is still very active along the Mill Creek drainage just southwest of Anaconda and south of Mud Lake.

Low and scattered amounts of defoliation from WSBW was found in the county during ground surveys. Very little visible defoliation from WSBW was recorded via ADS. DFB activity increased especially in the southwest part of the county.

WPBR has been found in LP in this county. Schweinitzii root and butt rot is common in DF, causing decay in butt logs but not acting as an aggressive root pathogen. LPPDM and LPDM are also present in the county.

Fergus County

Forestland, Mortality, and Defoliation Acres by Ownership (710,501 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	86,810	176,801	251,019	11,558	526,189
DFB	143	38	95	2	278
SB	2	0	2	0	4
MPB-LPP	4	6	10	4	24
MPB-PP	2,152	152	2,416	17	4,737
PE	0	0	4	0	4
SAF	4	2	0	0	6
WSBW	14,884	571	4,178	67	19,700
QA Damage	0	0	28	11	39

In 2014, ADS was conducted over similar areas as 2013 and included the Snowy, Moccasin, and Judith Mountains. MPB-caused mortality decreased again in 2014 to one-third 2013 levels—from around 16,000 acres to under 5,000 acres—despite a nominal decrease of 14% in acres surveyed. This decrease in MPB activity occurred principally in the Little Snowy Mountains and the southern edge of the Big Snowy Mountains in the PP host type, although all host types are present and experiencing mortality in the county. The DFB activity detected also decreased, but remained an active and scattered agent in both the Snowy and Judith Mountains (and surrounding forested islands). Defoliation by WSBW increased over 2013 levels to 19,700 acres and was located mostly in the Big Snowy Mountains.

ADS detected six polygons (from two to 20 acres and totaling approximately 40 acres) of QA damage about 13 miles south of Lewistown. Armillaria root disease occurs in the Moccasin Mountains north of Lewistown and near Crystal Lake. LPPDM is also present in this county.

Flathead County

Forestland, Mortality, and Defoliation Acres by Ownership (2,774,015 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	1,726,776	507,120	422,938	132,807	2,789,642
BWA	2	0	0	0	2
DFB	901	187	280	95	1,463
Elytroderma	0	0	67	0	67
SB	0	8	2	0	10
FE	88	1	41	2	132
Larch Needle Diseases	1,186	0	7	0	1,193
Unknown Needle Disease-PP	1,332	0	0	0	1,332
MPB-LPP	924	2,123	288	9	3,344
MPB-PP	9	2	83	16	110
MPB-WP	0	0	2	0	2
MPB-High Elevation	2	0	0	0	2
PE	0	0	6	0	6
SAF	419	102	17	15	553
WSBW	228,664	54,143	14,433	13,371	310,611
Western Gall Rust	0	0	67	0	67
QA Damage	23	0	0	0	23
Flooding	2	0	0	0	2
Windthrow	0	16	0	0	16

Most of the county was flown in 2014 with the exception of the wilderness areas. The insect causing the most damage in the county again was WSBW. Acres with defoliation from WSBW almost doubled in 2014 and were scattered throughout the county, especially in the Whitefish and Flathead Mountain Ranges and near Upper Stillwater and Tally Lakes. No defoliation from DFTM was recorded via ground or ADS surveys in 2014. DFB activity remained elevated and at similar levels as in 2013.

MPB activity significantly increased in LPP, both in acres affected and intensity. MPB activity decreased in PP, WWP, and high elevation five-needle pines in 2014.

SB significantly decreased in 2014, while FE and PE activity remained low and at similar levels as in 2013. Several acres affected by BWA were recorded by ADS for the first time in this county. This introduced insect causes gouting of tree tips and branches and can cause tree mortality when insect population levels are high. SAF mortality was also recorded.

ADS detected 23 acres of QA damage five miles east of West Glacier and 16 acres of LPP windthrow about eight miles west-southwest of East Glacier. PP with damage attributed to both Elytroderma needle disease and western gall rust was identified by ADS about six miles west-northwest of Elmo. ADS detected 1,192 acres of larch needle cast along the northwest and west-central border with Lincoln County. This is less than one-third of the acres mapped in 2013 which was a substantial decrease from 2012. ADS also detected 1,332 acres of unknown foliar damage to PP across five widely scattered polygons in west-central and southwest areas of the county.

Indian paint fungus was found causing extensive decay leading to stem failure of SAF in the Devil's Corkscrew Campground along the east side of Hungry Horse Reservoir (MFO-TR-14-

45). Pruning reduced WPBR losses in genetically improved WWP near the Hungry Horse Reservoir (MFO-TR-14-38).

Armillaria root disease, as well as other root diseases and stem decays, are damaging DF, true fir, and spruce in and around Lost Johnny Point Campground (MFO-TR-14-05). On the north end of McGregor Lake Campground LPPDM is damaging LPP (MFO-TR-14-27).

WPBR is common in both WWP and WBP in this county. Root diseases are common in counties west of the Continental Divide. The more common ones known to occur in this county are s-type annosus root disease, Armillaria root disease, and schweinitzii root and butt rot. The tree species most affected by all root diseases are DF and true firs. P-type annosus root disease is known to occur in PP in this county. DFDM, LPPDM, and WLDM are present and common in this county as well.

Gallatin County

Forestland, Mortality, and Defoliation Acres by Ownership (1,251,934 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	592,411	55,349	217,352	19,632	884,745
DFB	195	3	116	5	319
SB	39	4	13	4	60
MPB-LPP	232	2	38	8	280
MPB-PP	23	4	35	0	62
MPB-High Elevation	3,054	4	335	2	3,395
PE	0	0	2	0	2
SAF	89	8	14	3	114
WSBW	9,735	0	2,588	164	12,487
QA Damage	0	0	39	0	39
Unidentified Defoliator	2,002	15	11	0	2,028

Aerial surveys were conducted on a majority of Gallatin County. WSBW was the most active pest agent within Gallatin County in 2014. Defoliation caused by WSBW continued at lower infestation levels than observed in recent years throughout Gallatin Canyon and in the Bridger Mountains. MPB activity remained at low levels in LPP throughout the county and was most prevalent in high-elevation WBP located in Gallatin Canyon.

Similar acres of DFB activity were detected in 2014 as in 2013. Ground surveys indicated DFB-caused mortality at low to moderate levels (up to 40 trees per group) within the Portal Creek drainage and in adjacent drainages between Portal Creek and the Big Sky ski resort (MFO-TR-14-33). DFB-caused mortality is often hard to detect in defoliated trees; thus, the aerial surveyed acres and trees reported for DFB in this county are likely underestimated.

Ground surveys documented a substantial twig beetle outbreak occurring within fire-injured WBP in the Moose Jaw drainage following the Millie Fire of 2012 (MFO-TR-14-33). Twig beetle populations colonized severely fire-injured trees that likely would have died, while also colonizing trees with low-level injury and contributed to tree mortality.

ADS detected 39 acres of QA damage in six polygons widely scattered across the northeast area of the county.

Significant levels of schweinitzii root and butt rot and decay caused by tomentosus root disease in DF and ES occur in campgrounds and other portions of the Gallatin NF. Black stain root disease has been identified from DF, but is considered of minor importance.

LPPDM is a management concern in various areas, especially on flat land with obsidian sand soils. LPDM is present in the county, and WPBR is common in WBP and LP in this county.

Glacier County

Forestland, Mortality, and Defoliation Acres by Ownership (561,893 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	27,009	205,890	162,649	0	395,548
DFB	12	544	32	0	588
SB	0	94	4	0	98
Larch Needle Cast	0	87	194	0	281
MPB-LPP	0	216	0	0	216
SAF	2	547	20	0	569
WSBW	7	13,102	3,382	0	16,491
QA Damage	0	0	359	1,232	1,591

In 2014, aerial surveys were conducted in the mountainous, western portions of Glacier County. In this area WSBW activity continued, although the acres with defoliation detected were slightly reduced relative to 2013. Acres with DFB-caused mortality increased three-fold in 2014 relative to 2013 and primarily occurred in the northwestern portion of the county. Also of note, pockets of QA damage and SAF decline were detected near Saint Mary north and southwest of the city, respectively. The pockets of SAF decline decreased, while QA damage increased relative to 2013 levels.

ADS identified 281 acres of larch needle cast in five polygons spread across the northern half of the county from about six miles north of East Glacier almost to the Canadian border. In addition, ADS detected nearly 1,600 acres of QA damage beginning about 12 miles west-northwest of Browning and extending north to about half way between Babb and the Canadian border.

WPBR is common in WBP and LP. Armillaria root disease is known to be a significant pathogen in DF in the western portion of the county on the Blackfeet IR and the Lewis and Clark NF. LPPDM and WLDM are present in this county.

Golden Valley County

Forestland, Mortality, and Defoliation Acres by Ownership (84,646 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	17,111	5,704	58,463	0	81,278
DFB	2	0	4	0	6
MPB-PP	802	225	1,056	127	2,209
MPB-High Elevation	10	0	0	0	10
WSBW	5,376	854	820	28	7,078

A small area of forested lands in the far northern edge of the county that includes a portion of the Little and Big Snowy Mountains was surveyed by ADS in 2014 and was similar to the area flown in 2013. Acres with MPB-caused tree mortality in PP decreased compared to 2013, but were still found scattered throughout the PP type on the south side of the Snowy Mountains.

WSBW-caused defoliation increased 10-fold over 2013 and was found in the Big Snowy Mountains.

Granite County

Forestland, Mortality, and Defoliation Acres by Ownership (1,057,034 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	589,764	25,819	171,533	30,582	817,700
DFB	650	16	154	7	827
EBS	34	0	8	0	42
MPB-LPP	115,838	2,206	6,561	196	124,801
MPB-PP	197	7	46	6	256
MPB-High Elevation	10,064	6	1,151	0	11,221
SAF	38	0	2	0	40
WSBW	21,224	5,600	5,744	928	33,496

A majority of Granite County was flown in both 2013 and 2014. MPB activity slightly increased in both LPP and PP, however, the intensity or trees per acre killed increased by four to five-fold in many areas. Large areas of LPP have been killed in both the Flint Creek and Sapphire Mountains. Ground surveys confirmed that MPB is still active in and near the Anaconda-Pintler Wilderness. Barring an unusual weather event, MPB activity will continue to increase in intensity for at least another year where host trees are available. Host depletion will contribute to a decline in MPB activity over the next few years, across many areas in the county where activity has been high for many years.

Number of acres of WSBW-caused defoliation significantly increased in the county and was detected from ADS and ground surveys. DFB activity increased four-fold in acres affected and intensity in 2014, while SB remained at low levels.

Common root diseases found in this county include s-type annosus, Armillaria root disease, schweinitzii root and butt rot, and tomentosus root rot. DF and true firs are most affected by the first three root diseases and ES, SAF, and DF are most affected by tomentosus root rot. P-type annosus is known to occur in PP. Schweinitzii root and butt rot is contributing to mortality and structural tree failure of older DF in old growth areas of the Flint Foothills Project Area (MFO-TR-14-16).

Elytroderma needle disease occurs in the Barton Springs PP area (MFO-TR-14-18) and is a significant agent in PP in localized areas.

LPPDM and WLDM are present in this county. While LPPDM is an important agent to address, as much of Piney Campground is being regenerated due to MPB-caused mortality (MFO-TR-14-43).

Hill County

Forestland, Mortality, and Defoliation Acres by Ownership (68,890 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	0	0	30,788	1,535	32,323
DFB	0	4	26	0	30
MPB-LPP	0	4	348	1	353
MPB-PP	0	0	2	0	2
WSBW	0	0	15	0	15

The area in Hill County that was surveyed contains forested lands within the Rocky Boy's IR. MPB activity on the reservation significantly decreased in 2014, primarily in LPP. WSBW activity also significantly declined across the reservation.

Schweinitzii root and butt rot was found to be impacting DF stands near Bailey Peak, contributing to blow down in the area (MFO-TR-14-19, MFO-TR-14-40). Armillaria root disease and tomentosus root rot were also found in this same area (MFO-TR-14-40). Schweinitzii root and butt rot and low levels of Armillaria root disease can be found in stands near Bailey Mountain and in the general area of West Fork of Beaver Creek in the southern portion of Rocky Boy's IR. Red ray rot is very common in PP on private lands bordering the reservation. LPPDM is common in many stands. Elytroderma needle disease is impacting LPP in the West Fork Beaver Creek drainage.

Jefferson County

Forestland, Mortality, and Defoliation Acres by ownership (840,415 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	423,676	65,261	140,117	12,595	641,649
DFB	36	7	13	0	56
SB	34	0	4	0	38
MPB-LPP	125	3	37	0	165
MPB-PP	31	8	39	4	82
MPB-High Elevation	16	0	0	0	16
PE	18	12	2	0	32
WPB	2	2	0	0	4
SAF	62	2	2	0	66
WSBW	1,034	0	21	0	1,055

Most forested area in Jefferson County was surveyed by ADS in 2014, with slightly more acres flown in 2014 compared to 2013. Despite a nominal increase of 13% more acres surveyed, MPB activity decreased across the county, with the greatest decrease detected in high elevation five-needle pines along the Continental Divide. In PP, a slight increase in both MPB and PE activity resulted in just over 100 acres of PP mortality. Mortality due to DFB, SB, and SAF complex was detected but each had less than 70 acres as scattered trees across the county. Defoliation by WSBW also decreased to approximately one quarter of 2013 levels.

WPBR has been found on LP in this county.

Judith Basin County

Forestland, Mortality, and Defoliation Acres by Ownership (494,145 ac flwown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	274,980	0	21,438	5,875	302,294
DFB	78	2	8	2	90
SB	16	0	0	0	16
MPB-LPP	321	0	8	0	329
MPB-PP	59	0	8	13	80
MPB-High Elevation	419	0	239	0	658
PE	0	0	27	0	27
SAF	22	0	0	0	22
WSBW	18,680	313	917	171	20,081
QA Damage	0	0	16	0	16

A similar number of acres were flown between 2013 and 2014, which included portions of the Little Belt and Highwood Mountains. Declines in MPB activity (acres and total numbers of trees) in all host types continued into 2014. Decreases were two to five-fold or larger. Nearly 2/3 of the just over 1,000 acres of MPB affected acres were high elevation five-needle pine, with most of the remaining in LPP and approximately 80 acres in PP. Mortality due to DFB increased slightly, as did SAF mortality, but overall levels remained low. Defoliation from WSBW increased nearly seven-fold but was still less than half of levels detected in 2012; most was detected south of Sapphire Village and east of Hughesville.

ADS detected QA damage on 14 acres on the western side of the county and two acres on the northern end of the county.

Armillaria root disease and tomentosus root rot are significantly impacting ES, DF, and SAF in Dry Wolf campground (MFO-TR-13-10). WPBR is common in LP. Tomentosus root rot is known to be significant in some campgrounds. LPPDM is present in this county.

Lake County

Forestland, Mortality, and Defoliation Acres by Ownership (948,884 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	165,143	0	335,272	47,334	547,750
BWA	0	0	17	0	17
DFB	335	0	193	1,847	2,502
Elytroderma	0	0	1,672	109	1,781
SB	0	0	2	0	2
FE	396	0	66	179	641
Unknown Needle Disease-PP	136	0	121	0	257
MPB-LPP	32	0	505	70	607
MPB-PP	10	0	267	21	298
PE	0	2	75	12	89
SAF	20	0	92	6	118
Western Gall Rust	0	0	1,672	109	1,781
WSBW	34,927	0	5,170	5,431	45,528
Windthrow	21	0	86	0	107
Unidentified Defoliator	0	0	33	0	33

The majority of Lake County was flown in 2014. WSBW was the most common insect agent found in the county. Number of acres defoliated by WSBW increased by approximately 50% and was detected scattered across the county. Damage from WSBW was especially evident in the Mission Mountains. DFB activity also increased four-fold; many areas of beetle-killed trees were found in or near areas that were heavily defoliated by WSBW. DFB activity also increased in intensity in areas where it was recorded in 2013. DFTM was not recorded in the county in 2014.

MPB activity significantly increased by three-folds in LPP but decreased slightly in PP forests. Number of trees killed per acre by MPB increased in both LPP and PP. Pockets of MPB-caused tree mortality were again recorded in the Swan Valley and along the southern end of the Salish Mountain range. PE activity also increased in number of acres affected and intensity. PE activity is often found in association with MPB activity. SB remained at low levels but FE activity significantly increased. SAF mortality was recorded at low levels in 2014.

ADS detected 107 acres of windthrow of LPP and mixed conifer forest in central and west-central portions of the county. An unknown needle disease of PP was detected on 257 acres in the northwest corner of the county on the border with Flathead County. In addition, ADS detected damage to PP attributed to both Elytroderma needle disease and western gall rust on 1,781 acres scattered across the northwest area of the county. Very little of these acres overlapped with the more than 200 acres of Elytroderma needle disease mapped in 2013 or more than 1,100 acres mapped during the 2012 ADS. No larch needle cast was detected in 2014 after an increase to over 2,500 acres in 2013.

WPBR is common in both WWP and WBP. Root diseases are common in counties west of the Continental Divide. The more common ones known to occur in this county are s-type annosus root disease, Armillaria root disease, and schweinitzii root and butt rot. The tree species most affected are DF and true firs. P-type annosus root disease is known to occur in PP.

Elytroderma needle disease is a significant agent in PP in localized areas in this county, as noted by the ADS. DFDM, LPPDM, and WLDM are also present in this county.

Lewis and Clark County

Forestland, Mortality, and Defoliation Acres by ownership (1,427,562 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	947,135	66,144	337,858	35,384	1,386,522
DFB	330	19	91	80	520
SB	4	0	12	2	18
Larch Needle Cast	8	0	0	79	87
MPB-LPP	344	6	125	0	475
MPB-PP	30	29	137	19	215
MPW-High Elevation	10	0	2	0	12
PE	0	0	2	0	2
SAF	64	0	2	2	68
WPB	0	0	2	0	2
WSBW	59,945	1,131	13,842	1,896	76,814

Area covered by ADS was similar between 2013 and 2014, and covered most all forested area of the county. MPB-caused tree mortality in LPP, PP, and high elevation five-needle pines decreased again in 2014. Decreases of three to over 10-fold, by acres and numbers of trees killed, resulted in little more than 700 acres impacted by MPB. DFB activity changed little from 2013 levels but remains important at over 500 acres concentrated from Marysville to Rogers Pass, with more polygons scattered across the county. Defoliation by WSBW remains high—approximately 77,000 acres, compared with around 57,000 in 2013 and 65,000 in 2012—with concentrations of defoliation occurring north of highway 200 and near the Meagher County border.

Armillaria root disease is present in the southeastern portion of the county, and schweinitzii root and butt rot is quite common, causing significant decay in butt logs of larger, older DF. Root and butt rots are common near Indian Flats Rental Cabin (MFO-TR-14-10). Stem decay and schweinitzii root and butt rot are present and expected to become a greater concern as trees in Vigilante Campground grow older (MFO-TR-14-10). WPBR is common in WBP and LP. LPPDM is common in the county and impacting LPP in developed recreation sites (MFO-TR-14-09).

Liberty County

A visit to East Butte of the Sweetgrass Hills in 2013 documented WPBR in LP and WBP (Lockman, unpublished data). LPPDM is also present in this county.

Lincoln County

Forestland, Mortality, and Defoliation Acres by Ownership (2,313,162 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	1,723,060	0	387,173	55,797	2,166,031
BWA	499	0	2	0	501
DFB	2,557	0	429	213	3,199
SB	4	0	2	0	6
FE	168	0	42	4	214
Larch Needle Diseases	14,401	0	294	133	14,828
Unknown Needle Disease-PP	9,515	0	2,385	230	12,130
MPB-LPP	1,675	0	664	2	2,341
MPB-PP	263	0	46	9	318
MPB-WP	2	0	0	0	2
MPB-High Elevation	2	0	0	0	2
PE	2	0	0	0	2
SAF	820	0	41	0	861
WSBW	36,607	0	1,949	2,040	40,596
Unidentified Defoliator	9	0	389	59	457

Approximately 45% more acres were flown in 2014 than in 2013. WSBW was the most damaging insect in the county in 2014 followed by DFB (MFO-TR-14-34). WSBW caused-defoliation remained at similar levels to 2013, however, defoliation intensity increased along the eastern border of the county and in the Whitefish Mountain range. Mixed forests containing SAF were the most impacted by WSBW. DFB activity appears to have increased slightly in 2014, with many areas containing higher levels of intensity or trees per acre killed by beetles. This increase may in part be associated with high levels of WSBW damage in DF forests over the past few years.

MPB activity slightly increased in LPP and PP, but continues to decline in WWP and high elevation five-needle pines. MPB is still active in forested lands around Libby and can be found more commonly in the southern part of the county. Although similar numbers of acres of MPB-caused tree mortality were mapped, the number of trees killed per acre, or the intensity, increased in some locations.

ADS detected an unknown needle disease of PP on 12,130 acres and larch needle cast on 14,828 acres. This is a rebound of larch needle cast which had dropped from 13,000 acres in 2012 to around 2,000 acres in 2013. Both diseases were scattered across the county.

Pine leaf adelgid was identified as the causal agent significantly impacting planted WWP (MFO-TR-14-31). Damage included branch flagging; swollen branch ends; red needles much like a needle disease, except multiple years involved; numerous cohorts of red needles remaining attached; and resin droplets on affected branches reminiscent of WPBR branch cankers (MFO-TR-14-31).

Schweinitzii root and butt rot was found to be a significant agent in stands of older DF trees in Pinkham Creek (MFO-TR-14-34). Tomentosus root rot was found in the roots of a large, recently blown over DF in Sunday Creek (MFO-TR-14-34).

Armillaria root disease and schweinitzii root and butt rot were found to be impacting stands of mixed conifer in the Lower Yaak, O'Brien, Sheep (OLY) Project Area (MFO-TR-14-36). Also present and impacting stand health were WLDM and pini rot (MFO-TR-14-36). Elytroderma needle disease and Armillaria root disease were found severely impacting older planted PP in the OLY Project Area, indicating the trees may be from offsite stock (MFO-TR-14-36).

Schweinitzii root and butt rot was found impacting individual trees at the Murphy Lake RS compound and the Bunchgrass Site on the Kootenai NF, contributing to swollen butts and tree failure (MFO-TR-14-39). An unidentified root and butt rot was found severely impacting several large spruce trees at the Murphy Lake RS Compound and The Ant Flat Historical Site, contributing to tree failure (MFO-TR-14-39). Fruiting bodies of *Phellinus pini*, causal agent of pini rot, were identified on DF at the Bunchgrass Site on the Kootenai NF (MFO-TR-14-39).

A site visit to a stand in the Warland Creek drainage (MFO-TR-14-42) showed that schweinitzii root and butt rot is contributing to mortality of older DF and will increasingly contribute to structural stem failures along with pini rot if left untreated. WLDM is established in the western larch within this Warland Creek stand.

Root diseases are common in counties west of the Continental Divide. The more common ones known to occur in this county are s-type annosus root disease, armillaria root disease, laminated root disease, and schweinitzii root and butt rot. The tree species most affected are DF and true firs. P-type annosus root disease is known to occur in PP.

Atropellis cankers are present in many LPP east of Lake Koocanusa, reducing vigor of individual trees and contributing to stem failure. WPBR is common in both WWP and WBP. DFDM, LPPDM, and WLDM are present in this county.

Madison County

Forestland, Mortality, and Defoliation Acres by Ownership (1,476,988 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	594,247	110,585	191,273	12,414	908,520
DFB	116	68	41	16	241
SB	289	10	8	0	307
MPB-LPP	1,053	11	9	4	1,077
MPB-PP	0	0	4	0	4
MPB-High Elevation	2,443	46	1,010	0	3,499
SAF	106	15	13	2	136
WSBW	16,212	1,644	4,946	455	23,257
QA Damage	0	5	136	2	143

ADS covered more acres in 2014 compared to 2013, and covered most forested areas. Despite an increase of over 20% in total area surveyed in Madison County, MPB activity decreased in all host types. Nevertheless, scattered activity in high elevation five-needle pines was found throughout host type, with some larger polygons noted in the Tobacco Root Mountains and just south of Big Sky in the Madison Range. Mortality of LPP was principally in a few larger polygons on the north half of the Madison Range. SAF mortality also decreased somewhat from that detected in 2013.

Although numbers are still low, some increase in activity was detected in both DFB and SB to over 300 trees killed by each, and approximately 250 and 300 acres affected, respectively. WSBW-caused defoliation also increased back up to levels detected in 2012; defoliation was noted in all mountain ranges with most detected in the Gravelly and Ruby Mountains.

ADS detected QA damage on 143 acres in west-central area of the county. WPBR is common in WBP and LP. LPDM is present in this county. Schweinitzii root and butt rot is locally damaging to old DF stands.

Meagher County

Forestland, Mortality, and Defoliation Acres by Ownership (1,220,287 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	441,444	6,093	205,985	12,196	665,719
DFB	179	0	143	7	329
SB	32	0	2	0	34
MPB-LPP	193	0	21	0	214
MPB-PP	50	0	68	6	124
MPB-High Elevation	28	0	2	0	30
SAF	62	2	2	0	66
WSBW	9,313	242	12,069	280	21,904
QA Damage	20	0	204	6	230
Unidentified Defoliator	25	0	0	0	25

Most of the forested areas of Meagher County were surveyed in 2014, similar to what was surveyed in 2013. Acres with WSBW defoliation within the county increased three-fold from the prior year. Defoliation occurred primarily in the northwestern portion of the county, with lesser amounts in the southeastern and eastern areas. Limited amounts of MPB-caused mortality in LPP and DFB-caused mortality in DF were detected throughout the county as well.

QA decline was noted as mostly 2 to 30 acre polygons in the Castle Mountains (including one, 100-acre polygon) and Little Belt Mountains for a total of over 230 acres in the county.

A foliar scorch within the Wet Park LPP plantation appears to be related to a one-time environmental event, while comandra blister rust is an ongoing problem which is causing extensive damage within this performance test plantation (MFO-TR-14-11).

Jumping Creek Campground remains closed due to tree failures associated with tomentosus root disease and schweinitzii root and butt rot (MFO-TR-14-15).

WPBR is common in WBP and LP. LPPDM is present and damaging LPP in this county, as are comandra blister rust and atropellis canker.

Mineral County

Forestland, Mortality, and Defoliation Acres by Ownership (783,036 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	647,176	0	48,570	30,406	716,152
BWA	14	0	0	0	14
DFB	211	0	17	5	233
SB	42	0	0	0	42
FE	20	0	2	0	22
MPB-LPP	3,914	0	64	1	3,979
MPB-PP	118	0	22	4	144
SAF	220	0	2	0	222
WSBW	848	0	0	0	848

A similar area was surveyed by ADS between 2013 and 2014. MPB increased in number of acres affected and intensity for LPP, especially along the Montana-Idaho border. Scattered pockets of trees killed by MPB can be found throughout the county. Pockets of 20-30 trees can be found between Tarkio and the southwest county border. MPB activity decreased in PP forests.

WSBW activity decreased by about 50% in the county and was mostly found in the southern portion. SB and FE were recorded at similar low levels between 2013 and 2014. A few acres with BWA damage were recorded via ADS for the second year. Several hundred acres of SAF mortality were recorded in 2014.

No larch needle cast was detected by ADS in 2014, down from nearly 1,000 acres detected in 2013.

WPBR is common in WWP and WBP. The more common root diseases known to occur in this county are s-type annosus root disease, Armillaria root disease, laminated root disease, and schweinitzii root and butt rot. The species most affected are DF and true firs. Tomentosus root disease has been found impacting western larch trees heavily infected with larch dwarf mistletoe. P-type annosus root disease is known to occur in PP. DFDM, LPPDM, and WLDM are also present in this county.

Missoula County

Forestland, Mortality, and Defoliation Acres by Ownership (1,525,028 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	680,716	19,018	555,568	158,257	1,413,561
BWA	40	0	0	0	40
DFB	1,933	6	427	60	2,426
SB	14	0	8	2	24
FE	2	0	4	0	6
MPB-LPP	15,086	2	1,958	45	17,091
MPB-PP	408	4	429	136	977
MPB-High Elevation	4	0	0	0	4
PE	587	0	32	0	619
SAF	85	0	21	18	124
WPB	0	0	2	0	2
WSBW	35,302	2,433	29,939	7,801	75,475
Unidentified Defoliator	171	0	48	20	239

Approximately the same number of acres was flown in 2013 and 2014. WSBW was the most commonly found insect in the county in 2014. Defoliation from WSBW could be found across most of the eastern portion of the county, but also continues to be found at high levels especially along the chain of lakes north of Seeley Lake and in the Rock Creek drainage. Number of acres recorded defoliated by WSBW increased by about 30%. Ground surveys confirmed that in some areas north of Seeley Lake WSBW caused significant defoliation and damage to overstory fir and outright killing understory trees.

Acres affected by MPB activity increased in LPP forests, but intensity decreased. In 2014, areas with significant levels of MPB activity were found along the west-side of the county between Lolo Hot Springs and Alberton; south of Lolo; and along the Blackfoot river from Bonner east to the county line. Acres affected by PE increased by about five-fold. SB and WPB remained at low and scattered levels throughout the county. BWA was recorded via ADS in the county for the first time in 2014. Low levels of SAF mortality were recorded in 2014.

No larch needle cast was detected by ADS in 2014, down from over 1,500 acres detected in 2013.

Root diseases are common in counties west of the Continental Divide. The more common ones known to occur in this county are s-type annosus root disease, Armillaria root disease, laminated root disease, and schweinitzii root and butt rot. The tree species most affected are DF and true firs. P-type annosus root disease is known to occur in PP.

WPBR is common in both WWP and WBP. Elytroderma needle disease is a significant agent in PP in localized areas in this county. Comandra blister rust is common in PP in this county. DFDM, LPPDM, and WLDM are present in this county.

Musselshell County

Forestland, Mortality, and Defoliation Acres by Ownership (20,856 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	0	21,620	285,429	9,837	316,887
MPB-PP	0	0	70	0	70

Aerial surveys were limited to a small area in the northwestern portion of Musselshell County. In this location, MPB activity caused low levels of LPP mortality between Mineral and Willow Creeks.

Park County

Forestland, Mortality, and Defoliation Acres by Ownership (945,024 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	736,273	70,245	192,643	23,514	1,022,675
DFB	112	2	192	2	308
SB	8	0	10	0	18
MPB-LPP	50	60	103	0	213
MPB-PP	0	0	14	2	16
MPB-High Elevation	844	32	392	0	1,268
PE	2	0	0	0	2
SAF	63	6	11	0	80
WSBW	8,545	211	8,377	270	17,403
QA Damage	3	0	13	0	16

Within Park County, similar areas were aerially surveyed in 2014 as in 2013, with most forested areas outside designated wilderness surveyed. WSBW-caused defoliation continued within DF in the county, although fewer acres were detected in 2014 relative to 2013. Similarly, MPB activity declined and was active at low levels within isolated locations in WBP and, to a lesser extent, LPP host. Ground surveys indicated MPB activity near Gardiner, along Bear Creek drainage that was substantial in recent years, generally subsided in 2014 (MFO-TR-14-29).

ADS detected 15 acres of QA damage in three polygons spread across the northern half of the county.

WPBR is common in WBP and LP stands. Tomentosus root disease is known to be significant in some campgrounds, and LPPDM is present in the county. Tomentosus root rot and schweinitzii root and butt rot continue to contribute to the failure of ES in and around Snowbank Campground (MFO-TR-14-29).

Phillips County

Forestland, Mortality, and Defoliation Acres by Ownership (118,493 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	0	93,686	33,282	3,025	129,994
DFB	0	14	8	2	24
MPB-LPP	0	2	0	0	2
MPB-PP	0	40	31	0	71
Flood Damage	0	0	2	0	2

The western forested portions of Phillips County located on the Fort Belknap IR were surveyed in 2014. Defoliation from WSBW was not recorded on the reservation. MPB activity remained at similar and low levels in LPP and declined in PP forests.

ADS detected approximately eight trees killed by flooding in the southwest corner of the county.

Western gall rust and comandra blister rust are common in PP on the Fort Belknap IR causing stem deformities, branch mortality, top kill, and occasional whole tree mortality. In 2014, comandra blister rust, western gall rust, and isolated pockets of Dothistroma needle blight were found within several PP stands on the Fort Belknap IR, just east of Zortman (MFO-TR-14-14). Armillaria root disease can be found on the Fort Belknap IR, in the Mission Canyon area, with large pockets developing in DF and QA. LPPDM is present in the county.

Pondera County

Forestland, Mortality, and Defoliation Acres by Ownership (135,642 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	120,956	0	11,589	0	132,545
DFB	28	0	0	2	30
SB	37	0	0	0	37
MPB-LPP	10	0	0	0	10
SAF	122	0	0	0	122
WSBW	234	0	0	0	234
QA Damage	0	0	35	8	43

The forested western portion of the county was flown with 1/4 fewer acres surveyed than in 2013. Overall, insect activity continued to decrease with only a few, scattered polygons of MPB in LPP, DFB, SB, and SAF mortality noted. WSBW defoliation decreased in 2014 and was found on a small number of acres in a few, scattered larger polygons.

ADS detected 44 acres of QA damage in the southwest corner of the county. WPBR is common in WBP and LP in this county.

Powder River County

Forestland, Mortality, and Defoliation Acres by Ownership (359,154 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	261,469	64,537	160,913	10,525	497,445
PE	112	0	12	2	126

In 2014, aerial surveys were conducted in the west-central portion of Powder River County primarily in the forested areas within the Custer NF. Numerous scattered pockets of *Ips* spp.-caused mortality (ranging from 30-150 trees per group) were located throughout the eastern portion of the county within Ashland Ranger District of the Custer NF. Field assessments found a complex of Ips species causing the tree mortality. *Ips calligraphus* (six-spined ips) appeared to have caused the most mortality, while lesser amounts of PE and *Ips emarginatus* (emarginate ips) attacked pines as well (MFO-TR-14-21). This outbreak was triggered by severe drought conditions during the spring of 2012 and in early part of 2013. While geographically widespread, mortality was isolated to areas with dense stand conditions and marginal, dry growing environments.

Powell County

Forestland, Mortality, and Defoliation Acres by Ownership (1,211,992 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	645,154	71,518	238,550	38,356	993,578
DFB	99	22	117	18	256
SB	8	0	4	2	14
MPB-LPP	1,359	16	29	6	1,410
MPB-PP	136	5	116	14	271
MPB-High Elevation	2,245	0	0	0	2,245
SAF	168	10	6	2	186
WPB	0	0	2	0	2
WSBW	34,017	21,342	18,337	2,406	76,102
QA Damage	0	0	16	0	16
Avalanche	37	0	0	0	37
Unidentified Defoliator	0	0	2	0	2

In 2014, ADS surveyed slightly more acres than in 2013, which covered most forested areas. WSBW defoliation was found throughout most of the county in 2014. Twenty-five percent more acres were defoliated by WSBW. Significant defoliation from WSBW was recorded along the eastern border of the county and in the Swan Mountain Range. DFB activity increased slightly in number of acres affected, with intensity increased in the Swan Mountains. Some of the DFB activity was in or near areas that have been defoliated by WSBW over several years.

MPB activity remained at similar levels in LPP forests but increased in intensity; approximately five TPA killed on average. Most of the activity was recorded in the Flint Creek range and along the Continental Divide. MPB activity declined in PP forests, while the intensity remained the same at approximately four TPA. SB and WPB remained at low levels in 2014. Low levels of SAF mortality were recorded in 2014.

ADS detected 37 acres of trees damaged by a landslide in the southeast corner of the county and 16 acres of QA damage scattered across the southern half of the county.

Tomentosus root rot and schweinitzii root and butt rot were causing minimal impacts on a stand in the Cottonwood drainage, east of Seeley Lake (MFO-TR-14-07). Fruiting bodies of *Fomitopsis officianalis* were also found near this stand (MFO-TR-14-07).

The small patch of overstory LPP remained on the south end of Kading Campground after extensive MPB mortality in trees infested with dwarf mistletoe (MFO-TR-14-10). In addition, most of the smaller LPP in the campground were infected with lodgepole pine needle cast.

Ravalli County

Forestland, Mortality, and Defoliation Acres by Ownership (1,292,795 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	1,057,620	0	105,505	35,514	1,198,942
DFB	134	0	74	5	213
SB	90	0	8	2	100
MPB-LPP	80,386	0	951	27	81,364
MPB-PP	17,884	0	2,676	2,168	22,728
MPB-High Elevation	2,076	0	0	0	2,076
PE	6	0	0	0	6
SAF	147	0	3	0	150
WPB	0	0	4	0	4
WSBW	6,170	0	121	655	6,946
Dwarf Mistletoe	2	0	75	0	77

MPB was the most prevalent insect found throughout the county again. Number of acres affected by MPB decreased by approximately 30% for LPP; intensity decreased from nine to three TPA killed by beetles.

MPB activity remained at similar levels in PP forests but decreased in intensity. MPB activity decreased by approximately 50% in high-elevation WBP; the intensity also decreased significantly. The majority of MPB activity was mapped south of Hamilton where activity has been increasing over the past few years. MPB activity is expected to continue but overall mortality may decline over the next few years, especially in areas where suitable host trees remain (MFO-TR-14-02; MFO-TR-14-44).

DFB activity decreased in acres affected and intensity. WPB and PE remained at low and scattered levels throughout the county. In 2014, ADS recorded about 100 acres affected by SB; none were recorded in 2013. Low levels of SAF mortality were recorded in 2014.

Number of acres mapped that were defoliated by WSBW increased by approximately 30% between 2013 and 2014 (MFO-TR-14-13). Most of the WSBW activity was mapped in the northern part of the county along the Continental Divide.

Root diseases are common in counties west of the Continental Divide. The more common ones known to occur in this county are: s-type annosus root disease, Armillaria root disease, laminated root disease, and schweinitzii root and butt rot. The tree species most affected are DF and true firs. P-type annosus root disease is known to occur in PP in the foothills of both the Bitterroot and Sapphire Mountains. In Black Bear Campground, schweinitzii root and butt rot and tomentosus root rot are problems in DF and ES, respectively (MFO-TR-14-35). Armillaria root disease and stem decays are problems near the Canyon Creek Trailhead (MFO-TR-14-35).

WPBR is common in WBP. Notable levels of comandra blister rust cause top kill in PP in the foothills of the Bitterroot Mountains.

Elytroderma needle disease is a significant agent in PP in localized areas in this county; high levels continue to exist in the area around Lake Como. DFDM, LPPDM, and WLDM are present in this county, with DFDM being quite common in the lower elevations of the Sapphire and Bitterroot Mountains.

Rosebud County

Forestland, Mortality, and Defoliation Acres by ownership (379,182 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	70,060	31,019	279,489	36,862	417,430
PE	87	0	173	0	260

Aerial surveys were limited to the southern portion of Rosebud County in 2014. Numerous scattered pockets of *Ips* spp.-caused mortality (ranging from 30-150 trees per group) were located throughout the eastern portion of the county within the Northern Cheyenne IR and Ashland Ranger District of the Custer NF. Field assessments found a complex of Ips species causing the tree mortality. *Ips calligraphus* (six-spined ips) appeared to have caused the most mortality, while lesser amounts of PE and *Ips emarginatus* (emarginate ips) attacked pines as well (MFO-TR-14-21). This outbreak was triggered by severe drought conditions during the spring of 2012 and in early part of 2013. While geographically widespread, mortality was isolated to areas with dense stand conditions and marginal, dry growing environments.

Sanders County

Forestland, Mortality, and Defoliation Acres by Ownership (1,763,252 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	906,765	5,888	464,325	62,362	1,439,339
BWA	106	0	0	0	106
DFB	2,511	2	463	172	3,148
SB	41	0	19	8	68
FE	33	0	6	0	39
Larch Needle Diseases	221	0	34	0	255
Unknown Needle Disease-PP	660	0	2	0	662
MPB-LPP	3,803	2	1,102	157	5,064
MPB-PP	106	12	310	16	444
MPB-High Elevation	2	0	0	0	2
PE	2	0	43	0	45
SAF	202	0	38	2	242
WPB	2	0	0	0	2
WSBW	1,806	0	110	0	1,916
Unidentified Defoliator	43	0	0	0	43

MPB can be found killing trees in almost all parts of the county. Acres of MPB-killed LPP increased by approximately 25% between 2013 and 2014 and the intensity, or trees per acre killed, also significantly increased in some areas. Number of acres of PP killed by MPB decreased by approximately 50% but the intensity significantly increased. MPB-caused mortality in high elevation five-needle pine significantly decreased in acres killed and intensity.

Defoliation from WSBW significantly decreased in 2014 and is limited to the central and northwestern part of the county. DFB-caused tree mortality increased by approximately 50% in acres killed and intensity and is widely distributed across the county. Other bark beetles remained at low and scattered levels throughout the county.

BWA was recorded for the second consecutive year via ADS; number of acres detected increased by four-fold. Several hundred acres of SAF mortality were recorded.

ADS detected an unknown foliar disease on 661 acres of PP in the northwest area of the county. Larch needle cast was detected by ADS on 242 acres about 10 miles northwest of Plains and 13 acres about three miles northwest of Fishtrap Lake. This continues the decline in larch needle cast from over 11,000 acres in 2012 to about 1,300 in 2013, to a further 80% reduction in 2014.

Rhabdocline needle cast continues to be a problem in the Plains Tree Improvement Area, but with fungicide treatment the severity has been lessened significantly from 2013 (MFO-TR-14-12).

Root diseases are common in counties west of the Continental Divide. The more common ones known to occur in this county are s-type annosus root disease, Armillaria root disease, laminated root disease, and schweinitzii root and butt rot. The tree species most affected are DF and true firs. P-type annosus root disease is known to occur in PP, while tomentosus root disease is known to occur in localized areas in the county, affecting DF and ES. Armillaria root disease, schweinitzii root and butt rot, and DFDM are limiting health and longevity of DF in portions of the Little Eddy Project (MFO-TR-14-08).

WPBR is common in both WWP and WBP. DFDM, LPPDM, and WLDM are present and common in this county.

Silver Bow County

Forestland, Mortality, and Defoliation Acres by Ownership (447,785 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	141,487	25,719	74,189	11,669	253,065
DFB	70	16	6	10	102
SB	10	0	0	0	10
MPB-LPP	219	8	4	6	237
MPB-PP	0	2	4	0	6
MPB-High Elevation	886	0	0	0	886
SAF	6	0	0	0	6
WSBW	2,258	0	20	0	2,278

Nearly the entire county was surveyed in both 2013 and 2014. Striking was the continued sharp decline in MPB activity in LPP (one third of 2013 levels to under 250 acres), with an equally impressive increase in high elevation five-needle pine mortality (five-fold increase over 2013 levels to nearly 900 acres). Whereas LPP mortality was scattered throughout both the Highland and Fleecer Mountains, high elevation five-needle pine mortality was concentrated in a couple, larger polygons along the Deerlodge County border. Defoliation due to WSBW was detected at levels roughly equal to damage detected in 2012, an increase from a low in 2013. Also scattered through host type, most acres were concentrated on less than half a dozen polygons in the southeast Fleecers and northeast Highlands.

Several LPP stands within the Boulder-Lowlands Farm Bill project area are infested with dwarf mistletoe (MFO-TR-14-17).

WPBR is common in WBP and LP.

Stillwater County

Forestland, Mortality, and Defoliation Acres by Ownership (118,657 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	116,026	5,336	130,074	5,336	256,773
DFB	24	0	8	0	32
SB	10	0	0	0	10
MPB-LPP	73	0	44	0	116
MPB-PP	3	0	13	0	16
MPB-High Elevation	14	0	2	0	16
SAF	6	0	0	0	6
WSBW	389	0	332	0	721
QA Damage	9	0	16	0	25

In Stillwater County, forested areas south of Interstate 90, excluding designated wilderness, were aerially surveyed in 2014. In this area, WSBW defoliation of DF increased three-fold relative to 2013. MPB activity within LP was also detected at low levels in sporadic groups of mortality.

ADS detected 26 acres of QA damage about 1.5 miles east of Limestone.

Sweet Grass County

Forestland, Mortality, and Defoliation Acres by Ownership (436,610 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	240,872	9,647	147,138	3,361	401,288
DFB	208	2	19	0	229
SB	30	0	2	0	32
MPB-LPP	782	0	63	0	845
MPB-PP	8	0	10	0	18
MPB-High Elevation	2,787	0	16	0	2,803
SAF	28	0	4	0	32
WSBW	3,244	25	2,473	0	5,742
Windthrow	4	0	26	0	30

Similar areas—forested areas south of Interstate 90 outside of designated wilderness and forested areas in the Crazy Mountains that reside in Sweet Grass County—were aerially surveyed in the northwestern and southern portions of Sweet Grass County in 2013 and 2014. MPB-caused mortality increased two-fold in 2014, relative to 2013. MPB caused mortality in WBP and lesser amounts of LPP within the southern portion of the county. WSBW populations continued to cause DF defoliation within the northwestern portion of the county within the Crazy Mountains, at levels similar to those observed in 2013.

ADS detected 30 acres of LPP windthrow about 17 miles northwest of Big Timber. WPBR has been found in WBP and LP in this county. Tomentosus root rot, schweinitzii root and butt rot, and stem decays affect overmature conifers in this county.

Teton County

Forestland, Mortality, and Defoliation Acres by Ownership (190,630 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	188,000	24,247	18,928	7,789	238,965
DFB	64	6	4	0	74
SB	36	6	0	0	42
MPB-LPP	148	0	5	0	153
MPB-PP	0	0	4	2	6
MPB-High Elevation	2	0	0	15	17
SAF	56	2	0	2	60
WSBW	10	115	85	6	216
QA Damage	0	0	119	42	161
Avalanche	16	0	0	0	16

Much of the same area along the Rocky Mountain Front was flown in both 2013 and 2014, although 20% fewer acres were surveyed in total. Overall, insect activity continued to decrease with only a few, scattered polygons of MPB (in LPP, PP, and high elevation five-needle pine), DFB, SB, and SAF mortality noted. An increase in WSBW defoliation to over 200 acres was also detected but appears tied to a few, scattered large polygons at the southeast end of the Front Range.

ADS detected 16 acres of trees damaged by an avalanche about 26 miles west of Choteau and 161 acres of QA damage in the northwest corner of the county.

WPBR is common in WBP and LP in this county. While Armillaria root disease kills conifers and QA, and Tomentosus root disease and schweinitzii root and butt rot are causing damage in overmature conifers in parts of this county.

Toole County

WPBR occurs in WBP and LP in this county. A visit to West Butte of the Sweetgrass Hills in 2013 documented WPBR in LP.

Wheatland County

Forestland, Mortality, and Defoliation Acres by Ownership (197,431 ac flown)

Damage Agent	*National Forest*	*Other Federal*	*Private*	*State*	*Total*
Forestland	49,411	0	27,794	6,176	83,381
DFB	28	0	10	0	38
SB	4	0	0	0	4
MPB-PP	159	0	68	2	229
MPB-High Elevation	12	0	0	0	12
SAF	2	0	0	0	2
WSBW	8,193	96	783	0	9,072

Portions of the southeast Little Belt Mountains and northeast corner of the Crazy Mountains were surveyed in 2013 and 2014; over 1/3 more acres were covered in 2014. Despite the increased coverage, most insect damage agents showed a continued decrease in activity. Mortality of PP due to MPB and PE were both down, with no PE detected and MPB down over 10-fold to less than 250 total acres affected. Defoliation due to WSBW, however, was up six-fold to over 9,000 acres, mostly across the Little Belts.

WPBR occurs in LP in this county.

Table 1. Forest Mortality, Defoliation, and Other Damage on Montana National Forests, National Parks, and Tribal Lands, 2014

BEAVERHEAD NF		
DILLON RD	**Acres**	**Trees**
Douglas-fir Beetle	80	101
Spruce beetle	26	53
Mountain Pine Beetle (PP)	4	6
Mountain Pine Beetle (LPP)	30,671	293,088
Subalpine Fir Mortality	50	71
MPB (High Elev 5-needle Pines)	6,600	17,841
Western Spruce Budworm	1,694	0
Windthrow	92	0
MADISON RD		
Douglas-fir Beetle	60	95
Spruce beetle	102	178
Mountain Pine Beetle (LPP)	10	28
Subalpine Fir Mortality	50	165
MPB (High Elev 5-needle Pines)	388	363
Western Spruce Budworm	11,753	0
QA Damage	14	0
SHERIDAN RD		
Douglas-fir Beetle	52	66
Spruce beetle	68	78
Mountain Pine Beetle (LPP)	20	107
Subalpine Fir Mortality	56	190
MPB (High Elev 5-needle Pines)	826	2,854
Western Spruce Budworm	5,288	0
WISDOM RD		
Douglas-fir Beetle	12	24
Spruce beetle	12	22
Mountain Pine Beetle (PP)	37	725
Mountain Pine Beetle (LPP)	195,110	2,612,477
Subalpine Fir Mortality	4	7
MPB (High Elev 5-needle Pines)	8,094	28,677
Western Spruce Budworm	1,320	0
WISE RIVER RD		
Douglas-fir Beetle	835	3,970
Spruce beetle	26	35
Mountain Pine Beetle (PP)	1	3
Mountain Pine Beetle (LPP)	21,301	106,218
Subalpine Fir Mortality	16	83
MPB (High Elev 5-needle Pines)	5,580	15,653

BITTERROOT NF		
DARBY RD	**Acres**	**Trees**
Douglas-fir Beetle	35	41
Spruce beetle	26	29
Pine Engraver Beetle	2	40
Mountain Pine Beetle (PP)	10,738	12,468
Mountain Pine Beetle (LPP)	23,632	62,114
Subalpine Fir Mortality	35	26
MPB (High Elev 5-needle Pines)	546	412
Western Spruce Budworm	981	0
STEVENSVILLE RD		
Douglas-fir Beetle	17	38
Spruce beetle	12	19
Mountain Pine Beetle (PP)	1,729	2,143
Mountain Pine Beetle (LPP)	22,843	84,624
Subalpine Fir Mortality	57	20
MPB (High Elev 5-needle Pines)	14	31
Western Spruce Budworm	2,956	0
SULA RD		
Douglas-fir Beetle	19	54
Spruce beetle	12	18
Mountain Pine Beetle (PP)	4,514	9,254
Mountain Pine Beetle (LPP)	26,111	45,719
Subalpine Fir Mortality	6	3
MPB (High Elev 5-needle Pines)	1,187	1,281
Western Spruce Budworm	467	0
WEST FORK RD		
Douglas-fir Beetle	62	66
Spruce beetle	40	33
Mountain Pine Beetle (PP)	4	35
Mountain Pine Beetle (LPP)	756	1,562
Western Pine Beetle	8,096	12,675
Subalpine Fir Mortality	50	60
MPB (High Elev 5-needle Pines)	330	320
Western Spruce Budworm	1,766	0
CUSTER NF		
ASHLAND RD		
Pine Engraver Beetle (PP)	199	373
BEARTOOTH RD		
Douglas-fir Beetle	250	402

Beaverhead		
	Acres	**Trees**
Spruce beetle	30	58
Mountain Pine Beetle (PP)	26	36
Mountain Pine Beetle (LPP)	774	1,495
Subalpine Fir Mortality	234	457
MPB (High Elev 5-needle Pines)	2,964	7,832
Western Spruce Budworm	696	0
QA Damage	9	0
SIOUX RD		
Pine Engraver Beetle (PP)	47	39
DEERLODGE NF		
BUTTE RD		
Douglas-fir Beetle	46	172
Mountain Pine Beetle (LPP)	126	436
Subalpine Fir Mortality	10	24
MPB (High Elev 5-needle Pines)	162	912
Western Spruce Budworm	2,446	0
DEER LODGE RD		
Douglas-fir Beetle	60	188
Spruce beetle	6	7
Mountain Pine Beetle (PP)	15	20
Mountain Pine Beetle (LPP)	4,144	20,215
Subalpine Fir Mortality	24	51
MPB (High Elev 5-needle Pines)	8,048	37,323
Western Spruce Budworm	340	0
Avalanche	11	0
JEFFERSON RD		
Douglas-fir Beetle	20	30
Spruce beetle	86	48
Pine Engraver Beetle (PP)	18	105
Mountain Pine Beetle (PP)	12	15
Mountain Pine Beetle (LPP)	124	399
Subalpine Fir Mortality	42	82
MPB (High Elev 5-needle Pines)	66	226
Western Spruce Budworm	1,814	0
PHILIPSBURG RD		
Douglas-fir Beetle	523	2,331
Spruce beetle	22	24
Mountain Pine Beetle (PP)	29	95
Mountain Pine Beetle (LPP)	96,242	415,857
Subalpine Fir Mortality	22	53
MPB (High Elev 5-needle Pines)	4,618	25,520

CUSTER		
	Acres	**Trees**
Western Spruce Budworm	8,989	0
FLATHEAD NF		
GLACIER VIEW RD		
Douglas-fir Beetle	20	31
Mountain Pine Beetle (PP)	2	2
Mountain Pine Beetle (LPP)	6	15
Fir Engraver Beetle	12	60
Subalpine Fir Mortality	299	743
MPB (High Elev 5-needle Pines)	2	2
Balsam Woolly Adelgid	2	0
Western Spruce Budworm	50,582	0
Larch Needle Cast	92	0
HUNGRY HORSE RD		
Douglas-fir Beetle	184	642
Mountain Pine Beetle (PP)	1	1
Mountain Pine Beetle (LPP)	141	994
Fir Engraver Beetle	33	107
Subalpine Fir Mortality	48	149
Western Spruce Budworm	68,988	0
Flooding	2	5
QA Damage	23	0
SPOTTED BEAR RD		
Douglas-fir Beetle	30	75
Mountain Pine Beetle (LPP)	742	6,547
Fir Engraver Beetle	31	45
Subalpine Fir Mortality	9	21
Western Spruce Budworm	57,544	0
SWAN LAKE RD		
Douglas-fir Beetle	817	3,145
Mountain Pine Beetle (PP)	41	93
Mountain Pine Beetle (LPP)	224	1,924
Fir Engraver Beetle	408	1,020
Subalpine Fir Mortality	40	138
MPB (High Elev 5-needle Pines)	2	5
Western Spruce Budworm	51,163	0
Unknown Needle Disease (PP)	304	0
Windthrow	21	0
TALLY LAKE RD		
Douglas-fir Beetle	183	690
Mountain Pine Beetle (PP)	3	5
Mountain Pine Beetle (LPP)	6	15

	Acres	Trees
Fir Engraver Beetle	4	11
Subalpine Fir Mortality	21	66
Western Spruce Budworm	47,866	0
Unknown Needle Disease (PP)	100	0
Larch Needle Cast	1	0
GALLATIN NF		
BIG TIMBER RD		
Douglas-fir Beetle	203	149
Spruce beetle	28	71
Mountain Pine Beetle (PP)	8	4
Mountain Pine Beetle (LPP)	650	898
Subalpine Fir Mortality	30	66
MPB (High Elev 5-needle Pines)	2,001	1,233
Western Spruce Budworm	2,934	0
Windthrow	4	0
BOZEMAN RD		
Douglas-fir Beetle	179	203
Spruce beetle	98	61
Mountain Pine Beetle (PP)	23	14
Mountain Pine Beetle (LPP)	1,231	2,634
Subalpine Fir Mortality	34	30
MPB (High Elev 5-needle Pines)	2,953	2,241
Western Spruce Budworm	6,116	0
GARDINER RD		
Douglas-fir Beetle	10	15
Spruce beetle	6	5
Mountain Pine Beetle (LPP)	2	5
Subalpine Fir Mortality	21	46
MPB (High Elev 5-needle Pines)	659	757
Western Spruce Budworm	3,894	0
HEBGEN LAKE RD		
Douglas-fir Beetle	22	23
Spruce beetle	8	5
Mountain Pine Beetle (LPP)	23	62
Subalpine Fir Mortality	68	131
MPB (High Elev 5-needle Pines)	120	178
Western Spruce Budworm	6,283	0
Unidentified Defoliator	2,001	0

	Acres	Trees
LIVINGSTON RD		
Douglas-fir Beetle	89	125
Spruce beetle	9	6
Mountain Pine Beetle (LPP)	52	133
Subalpine Fir Mortality	28	50
MPB (High Elev 5-needle Pines)	1,338	1,302
Western Spruce Budworm	2,980	0
QA Damage	3	0
HELENA NF		
HELENA RD		
Douglas-fir Beetle	133	105
Spruce beetle	22	15
Mountain Pine Beetle (PP)	41	22
Mountain Pine Beetle (LPP)	92	351
Western Pine Beetle	2	1
Subalpine Fir Mortality	40	25
MPB (High Elev 5-needle Pines)	15	27
Western Spruce Budworm	22,082	0
Avalanche	26	0
LINCOLN RD		
Douglas-fir Beetle	210	400
Spruce beetle	2	1
Mountain Pine Beetle (PP)	12	6
Mountain Pine Beetle (LPP)	14	80
Subalpine Fir Mortality	22	23
Western Spruce Budworm	42,295	0
TOWNSEND RD		
Douglas-fir Beetle	463	583
Spruce beetle	14	8
Mountain Pine Beetle (PP)	16	11
Mountain Pine Beetle (LPP)	18	82
Western Pine Beetle	2	1
Subalpine Fir Mortality	30	54
MPB (High Elev 5-needle Pines)	11	33
Western Spruce Budworm	15,730	0
QA Damage	2	0
KOOTENAI NF		
CABINET RD		
Douglas-fir Beetle	2,091	7,869
Mountain Pine Beetle (PP)	22	58
Mountain Pine Beetle (LPP)	3,408	20,871

	Acres	Trees
Fir Engraver Beetle	23	65
Subalpine Fir Mortality	58	160
MPB (High Elev 5-needle Pines)	2	5
Balsam Woolly Adelgid	54	0
Western Spruce Budworm	1,946	0
Unknown Needle Disease (PP)	647	0
FISHER RIVER RD		
Douglas-fir Beetle	969	2,620
Mountain Pine Beetle (PP)	41	54
Mountain Pine Beetle (LPP)	1,298	8,744
Fir Engraver Beetle	31	92
Subalpine Fir Mortality	65	199
Western Spruce Budworm	11,100	0
Unknown Needle Disease (PP)	3,964	0
Larch Needle Cast	2,876	0
FORTINE RD		
Douglas-fir Beetle	164	289
Mountain Pine Beetle (PP)	4	8
Mountain Pine Beetle (LPP)	36	55
Fir Engraver Beetle	4	20
Subalpine Fir Mortality	294	746
MPB (High Elev 5-needle Pines)	2	3
Western Spruce Budworm	13,626	0
Unknown Needle Disease (PP)	2,323	0
Larch Needle Cast	1,542	0
LIBBY RD		
Douglas-fir Beetle	602	1,140
Pine Engraver Beetle (PP)	2	3
Mountain Pine Beetle (PP)	47	56
Mountain Pine Beetle (LPP)	82	251
Fir Engraver Beetle	109	205
Subalpine Fir Mortality	71	202
Balsam Woolly Adelgid	2	0
Western Spruce Budworm	3,047	0
Unidentified Defoliator	9	0
Unknown Needle Disease (PP)	275	0
Larch Needle Cast	119	0
REXFORD RD		
Douglas-fir Beetle	99	220
Spruce beetle	2	2
Mountain Pine Beetle (WP)	2	3

	Acres	Trees
Mountain Pine Beetle (PP)	120	74
Mountain Pine Beetle (LPP)	10	40
Fir Engraver Beetle	2	5
Subalpine Fir Mortality	144	282
Balsam Woolly Adelgid	45	0
Western Spruce Budworm	6,488	0
Unknown Needle Disease (PP)	1,476	0
Larch Needle Cast	2,527	0
THREE RIVERS RD		
Douglas-fir Beetle	768	2,411
Spruce beetle	2	2
Mountain Pine Beetle (PP)	50	57
Mountain Pine Beetle (LPP)	226	1,518
Fir Engraver Beetle	16	32
Subalpine Fir Mortality	259	818
MPB (High Elev 5-needle Pines)	2	2
Balsam Woolly Adelgid	436	15
Western Spruce Budworm	1,755	0
Unknown Needle Disease (PP)	2,645	0
Larch Needle Cast	8,430	0
LEWIS and CLARK NF		
JUDITH RD		
Douglas-fir Beetle	258	486
Spruce beetle	22	17
Mountain Pine Beetle (PP)	59	58
Mountain Pine Beetle (LPP)	332	558
Subalpine Fir Mortality	26	21
MPB (High Elev 5-needle Pines)	419	240
Western Spruce Budworm	26,333	0
KINGS HILL RD		
Douglas-fir Beetle	249	180
Spruce beetle	16	9
Mountain Pine Beetle (PP)	46	28
Mountain Pine Beetle (LPP)	1,203	1,478
Subalpine Fir Mortality	42	29
MPB (High Elev 5-needle Pines)	2	1
Western Spruce Budworm	50	0
Unidentified Defoliator	25	0
QA Damage	18	0
MUSSELSHELL RD		
Douglas-fir Beetle	69	209

	Acres	Trees
Spruce beetle	15	9
Mountain Pine Beetle (PP)	3,116	4,153
Mountain Pine Beetle (LPP)	29	89
Subalpine Fir Mortality	26	48
MPB (High Elev 5-needle Pines)	48	75
Western Spruce Budworm	25,054	0
ROCKY RD		
Douglas-fir Beetle	154	155
Spruce beetle	73	150
Mountain Pine Beetle (LPP)	480	1,439
Subalpine Fir Mortality	216	293
MPB (High Elev 5-needle Pines)	12	17
Western Spruce Budworm	8,494	0
Larch Needle Cast	8	0
Avalanche	16	0
LOLO NF		
MISSOULA RD		
Douglas-fir Beetle	265	633
Spruce beetle	12	11
Pine Engraver Beetle (PP)	587	1,013
Mountain Pine Beetle (PP)	444	534
Mountain Pine Beetle (LPP)	31,934	100,202
Subalpine Fir Mortality	35	101
MPB (High Elev 5-needle Pines)	80	63
Western Spruce Budworm	13,882	0
NINEMILE RD		
Douglas-fir Beetle	126	132
Spruce beetle	20	16
Mountain Pine Beetle (PP)	143	177
Mountain Pine Beetle (LPP)	3,922	13,752
Fir Engraver Beetle	4	4
Subalpine Fir Mortality	129	226
Balsam Woolly Adelgid	51	0
Western Spruce Budworm	43	0
Unidentified Defoliator	171	0
PLAINS RD		
Douglas-fir Beetle	193	197
Spruce beetle	25	25
Mountain Pine Beetle (PP)	35	28
Mountain Pine Beetle (LPP)	352	709
Western Pine Beetle	2	1

	Acres	Trees
Fir Engraver Beetle	6	3
Subalpine Fir Mortality	67	78
Unknown Needle Disease (PP)	13	0
Larch Needle Cast	221	0
Unidentified Defoliator	43	0
SEELEY LAKE RD		
Douglas-fir Beetle	1,691	143
Mountain Pine Beetle (PP)	137	619
Mountain Pine Beetle (LPP)	708	2,240
Subalpine Fir Mortality	146	262
MPB (High Elev 5-needle Pines)	2	2
Balsam Woolly Adelgid	2	0
Western Spruce Budworm	40,430	0
SUPERIOR RD		
Douglas-fir Beetle	162	173
Spruce beetle	34	19
Pine Engraver Beetle (PP)	48	37
Mountain Pine Beetle (LPP)	735	1,772
Fir Engraver Beetle	16	10
Subalpine Fir Mortality	125	86
Western Spruce Budworm	805	0
THOMPSON FALLS RD		
Douglas-fir Beetle	210	275
Spruce beetle	14	13
Pine Engraver Beetle (PP)	2	1
Mountain Pine Beetle (PP)	42	23
Mountain Pine Beetle (LPP)	64	183
Fir Engraver Beetle	4	2
Subalpine Fir Mortality	90	103
BLACKFEET IR		
Douglas-fir Beetle	17	41
Spruce beetle	4	6
Subalpine Fir Mortality	20	30
Western Spruce Budworm	3,056	0
Larch Needle Cast	180	0
QA Damage	1,232	0
CROW IR		
Douglas-fir Beetle	24	17
Spruce beetle	2	1
Mountain Pine Beetle (PP)	12	7
Mountain Pine Beetle (LPP)	18	58

	Acres	Trees
Mountain Pine Beetle (WP)	2	5
Pine Engraver Beetle (PP)	290	1,259
Subalpine Fir Mortality	4	4
MPB (High Elev 5-needle Pines)	8	20
Western Spruce Budworm	1,347	0
QA Damage	144	0
FLATHEAD IR		
Douglas-fir Beetle	2,126	7,464
Spruce beetle	2	2
Pine Engraver Beetle (PP)	103	183
Mountain Pine Beetle (PP)	380	703
Mountain Pine Beetle (LPP)	790	2,442
Fir Engraver Beetle	2	3
Subalpine Fir Mortality	124	332
Western Spruce Budworm	1,769	0
Balsam Woolly Adelgid	17	0
Larch Needle Cast	25	0
Western Gall Rust	1,525	0
Windthrow	86	0
Elytroderma	1,525	0
FORT BELKNAP IR		
Douglas-fir Beetle	32	55
Mountain Pine Beetle (PP)	91	199
Mountain Pine Beetle (LPP)	29	43
Western Spruce Budworm	15	0
Subalpine Fir Mortality	2	1
Flooding	2	8
NORTHERN CHEYENNE IR		
Pine Engraver Beetle (PP)	387	1,004
ROCKY BOY'S IR		
Douglas-fir Beetle	68	115
Mountain Pine Beetle (PP)	4	2
Mountain Pine Beetle (LPP)	337	530
Western Spruce Budworm	207	0
GLACIER NP		
Douglas-fir Beetle	731	3,898
Spruce beetle	102	294
Mountain Pine Beetle (PP)	2	1
Mountain Pine Beetle (LPP)	2,339	17,145
Subalpine Fir Mortality	649	1,601

	Acres	Trees
Western Spruce Budworm	67,212	0
Larch Needle Cast	82	0
Flooding	2	5
Windthrow	16	0
YELLOWSTONE NP		
Douglas-fir Beetle	26	36
Spruce beetle	210	235
Mountain Pine Beetle (LPP)	406	456
MPB (High Elev 5-needle Pines)	256	414
Subalpine Fir Mortality	212	329
Western Spruce Budworm	1,823	0
Balsam Woolly Adelgid	177	0
Unidentified Defoliator	2,372	0

Table 2. Host Type Infested by Bark Beetles on all Ownerships Statewide, 2014 (Acres)[2]

Insect[1]	USFS	Other Fed	Private	State	Total
DFB	12,737	3,364	3,273	1,092	20,466
SB	893	132	117	24	1,166
FE	706	3	158	185	1,052
PE	845	804	351	24	2,024
MPB-LPP	477,449	9,124	21,086	5,719	513,378
MPB-PP	22,539	987	7,654	2,589	33,769
MPB-5-NP	47,091	268	4,217	107	51,683
MPB-WP	2	2	2	0	6
MPB-ALL	547,081	10,381	32,959	8,415	598,836
SAF	3,143	880	168	44	4,235
WPB	6	4	12	0	22

[1]DFB = Douglas-fir beetle; SB = spruce beetle; FE = fir engraver beetle; PE = pine engraver beetle; MPB LPP = mountain pine beetle in lodgepole pine; MPB PP = mountain pine beetle in ponderosa pine; MPB 5-NP = mountain pine beetle in 5-Needle pines (WBP & LP); MPB WP = mountain pine beetle in western white pine; MPB All = mountain pine beetle in all pines; SAF = Subalpine fir mortality complex; WPB = western pine beetle

[2]Includes areas surveyed in Yellowstone NP within WY

Table 3. Bark Beetle Infestations Statewide, 2012-2014

	2012		2013		2014	
Insects[2]	Acres	Trees	Acres	Trees	Acres	Trees
DFB	3,012	3,651	15,901	39,034	20,466	54,071
SB	323	465	571	437	1,166	1,478
FE	84	72	382	1,018	1,052	3,795
MPB	666,336	1,443,184	526,458	2,570,042	598,836	4,306,984
PE	119	141	618	1,178	2,024	5,674
SAF	2,908	4,392	6,973	19,383	4,235	9,229
WPB	6	3	36	18	22	20
Total	672,788	1,451,908	550,939	2,631,110	627,801	4,381,251

[1]Includes areas surveyed in Yellowstone NP within WY

[2]DFB = Douglas-fir beetle; SB = Spruce beetle; FE = fir engraver beetle; PE = pine engraver beetle; MPB = mountain pine beetle; SAF = subalpine fir mortality complex; WPB = western pine beetle.

Table 4. Douglas-fir Beetle-Caused Mortality on all Ownerships Statewide, 2012-2014

	2012		2013		2014	
Reporting Area	**Acres**	**Trees**	**Acres**	**Trees**	**Acres**	**Trees**
Beaverhead	87*	97*	257*	252*	1,702	7,309
Bitterroot	194*	6*	1,497	7,012	252	359
Custer	★	★	1,660*	4,986*	382	531
Deerlodge	60*	87*	305*	406*	872	3,451
Flathead	223	251	1,513	3,111	1,831	6,592
Gallatin	209*	354*	3,233*	10,954*	859	929
Garnets	44	64	62	69	112	151
Helena	101*	93*	695*	1,227*	1,232	1,729
Kootenai	653	752	3,171*	6,366*	5,503	16,816
Lewis and Clark	122*	137*	887	1,257	1,077	1,508
Lolo	736	689	1,398*	1,983*	3,136	2,218
Blackfeet IR	20	41	39	38	32	84
Crow IR	★	★	16	9	24	17
Flathead IR	171	217	545	581	2,382	8,093
Fort Belknap IR	16	19	106	503	52	92
No. Cheyenne IR	★	★	0	0	0	0
Rocky Boy's IR	8	10	6	5	267	238
Glacier NP	364	830	509*	275*	728	3,909
Yellowstone NP[1]	★	★	12*	10*	26	36
Total	**3,008**	**3,648**	**15,901**	**39,034**	**20,469**	**54,062**

★ = Not surveyed *= Partially surveyed

[1]Yellowstone NP includes acres in MT, ID, and WY

Table 5. Mountain Pine Beetle-Caused Mortality on State and Private Lands, Statewide, 2012-2014 (Acres)

	2012				2013				2014			
Reporting Area	**LPP**	**PP**	**5-NP**	**WWP**	**LPP**	**PP**	**5-NP**	**WWP**	**LPP**	**PP**	**5-NP**	**WWP**
Beaverhead	9,090*	32*	27*	0*	9,792*	7*	407*	0*	12,332	31	223	0
Bitterroot	4,944*	7,397*	0*	0*	2,320	3,175	0	0	984	4,907	0	0
Custer	★	★	★	★	109*	230*	94*	0*	742	17	10	0
Deerlodge	16,417*	1,298*	217*	0*	10,124*	126*	1,124*	0*	8,018	61	2,144	0
Flathead	531	623	0	2	228	75	9	5	504	118	0	0
Gallatin	1,662*	12*	650*	0*	1,326*	16*	511*	0*	220	67	1,688	0
Garnets	3,615	5,238	0	0	66	253	0	0	21	181	0	0
Helena	4,020*	8,999*	2*	0*	580*	1,318*	4*	0*	178	308	4	0
Kootenai	1,025	107	0	52	427*	23*	2*	144*	746	67	0	2
Lewis and Clark	4,401*	30,528*	46*	0*	1,026	14,999	137	0	89	3,852	254	0
Lolo	5,147	4,583	0	0	194*	816*	4*	2*	2,854	463	0	0
Blackfeet IR	86	0	2	0	14	0	0	0	0	0	0	0
Crow IR	★	★	★	★	472	49	294	0	18	16	8	2
Flathead IR	44	156	2	0	243	872	0	0	870	540	0	0
Fort Belknap IR	6	53	0	0	6	548	0	0	34	96	0	0
No. Cheyenne IR	★	★	★	★	0	108	0	0	0	0	0	0
Rocky Boy's IR	504	419	0	0	2,759	36	0	0	324	6	0	0
Glacier NP	22	0	0	0	2*	0*	0*	0*	19	0	0	0
Yellowstone NP[1]	★	★	★	★	1,549*	0*	56*	0*	0	0	0	0
Total	**51,514**	**59,445**	**946**	**54**	**31,237**	**22,651**	**2,642**	**151**	**27,953**	**10,730**	**4,331**	**4**

[1]LPP = lodgepole pine; PP = ponderosa pine; 5-NP = 5-needle pines (WBP & LP); WWP = western white pine

★ = Not surveyed; * = Partially surveyed; [1]Yellowstone NP includes MT, ID, and WY acres

Table 6. Mountain Pine Beetle-Caused Mortality on all Federal Ownerships, Statewide, 2012-2014 (Acres)

	2012				2013				2014			
Reporting Area	**LPP**	**PP**	**5-NP**	**WWP**	**LPP**	**PP**	**5-NP**	**WWP**	**LPP**	**PP**	**5-NP**	**WWP**
Beaverhead	69,551*	67*	8,447*	0*	157,217*	21*	8,101*	0*	250,589	45	21,703	0
Bitterroot	138,396*	38,232*	1,425*	0*	120,693	15,523	4,423	0	80,687	17,890	2,076	0
Custer	★	★	★	★	953*	365*	1,340*	0*	777	28	2,968	0
Deerlodge	92,093*	1,047*	668*	0*	97,647*	59*	5,385*	2*	102,837	68	12,899	0
Flathead	5,876	118	6	0	710	599	93	345	997	46	4	0
Gallatin	2,416*	2*	4,134*	0*	4,046*	0*	5,672*	0*	2,018	35	7,071	0
Garnet	8,151	968	0	0	74	9	0	0	45	9	0	0
Helena	14,319*	6,209*	503*	0*	1,885*	424*	151*	0*	135	110	26	0
Kootenai	10,639	451	112	1,211	3,995*	181*	1,094*	114*	5,062	285	4	2
Lewis and Clark	52,792*	35,129*	6,120*	0*	12,971	15,408	4,842	0	2,050	3,609	481	0
Lolo	38,651	7,858	4	0	4,463*	1,450*	108*	2*	37,720	857	82	0
Blackfeet IR	486	0	0	0	0	0	0	0	0	0	0	0
Crow IR	★	★	★	★	0	0	0	0	0	0	0	0
Flathead IR	904	662	2	0	1	2	0	0	2	12	0	0
Fort Belknap IR	157	1,189	0	0	45	382	0	0	2	40	0	0
No. Cheyenne IR	★	★	★	★	0	0	0	0	0	0	0	0
Rocky Boy's IR	946	103	0	0	46	0	0	0	4	0	0	0
Glacier NP	4,325	2	0	0	323*	6*	0*	0*	2,474	2	0	0
Yellowstone NP[1]	★	★	★	★	1,549*	0*	56*	0*	404	0	220	0
Total	**439,702**	**92,037**	**21,421**	**1,211**	**406,618**	**34,429**	**31,265**	**463**	**485,803**	**23,036**	**47,534**	**2**

[1] LPP = Lodgepole pine; PP = Ponderosa pine; 5-NP = 5-needle pines (WBP & LP); WWP = Western white pine

★ = Not surveyed; * = Partially surveyed; [1]Yellowstone NP includes MT, ID, and WY acres

Table 7. Additional Bark Beetle-Caused Mortality on all Ownerships, Statewide, 2012-2014 (Acres)

	Spruce Beetle			Fir Engraver			Pine Engraver			Subalpine Fir Mortality			Western Pine Beetle		
Reporting Area	**2012**	**2013**	**2014**	**2012**	**2013**	**2014**	**2012**	**2013**	**2014**	**2012**	**2013**	**2014**	**2012**	**2013**	**2014**
Beaverhead	20*	98*	248	0*	0*	0	0*	0*	0	48*	194*	251	0*	0*	0
Bitterroot	0*	0	100	0*	0	0	0*	4	6	26*	120	150	0*	12	4
Custer	★	21*	32	★	0*	0	★	0*	266	★	1,170*	235	★	0*	0
Deerlodge	2*	34*	132	0*	2*	0	0*	0*	30	6*	88*	102	0*	2*	2
Flathead	2	128	2	6	189	767	0	243	6	274	1,687	463	0	0	0
Gallatin	8*	6*	187	0*	0*	0	0*	0*	2	307*	957*	216	0*	0*	0
Garnets	2	4	0	0	0	0	2	0	0	0	18	12	0	6	0
Helena	0*	4*	66	0*	0*	0	0*	48*	6	38*	66*	108	2*	0*	8
Kootenai	86	91*	6	58	0*	233	2	0*	2	702	207*	898	0	10*	0
Lewis and Clark	4*	44	138	0*	0	0	111*	153	31	141*	690	316	0*	0	2
Lolo	22	102*	142	0	18*	36	2	6*	632	501	546*	624	2	6*	4
Blackfeet IR	32	8	4	0	0	0	0	0	0	63	18	20	0	0	0
Crow IR	★	2	2	★	168	0	★	0	471	★	4	4	★	0	0
Flathead IR	0	8	2	0	6	10	2	0	121	89	94	124	2	0	0
Fort Belknap IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
No. Cheyenne IR	★	0	0	★	0	0	★	0	452	★	0	0	★	0	2
Rocky Boy's IR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Glacier NP	142	0*	102	2	0*	0	0	0*	0	664	1,111*	649	0	0*	0
Yellowstone NP[1]	★	0*	4	★	0*	0	★	0*	0	★	2*	212	★	0*	0
Total	**320**	**571**	**1,167**	**66**	**382**	**1,046**	**119**	**618**	**2,025**	**2,859**	**6,973**	**4,384**	**6**	**36**	**22**

★ = Not surveyed * = Partially surveyed

[1]Yellowstone NP includes MT, ID, and WY acres

Table 8. Western Spruce Budworm Defoliation by Reporting Area on all Ownerships, Statewide, 2012-2014 (Acres)

Reporting Area	2012	2013	2014
Beaverhead	99,381*	19,720*	53,401
Bitterroot	12,552*	4,521	7,382
Custer	★	4,945	1,059
Deerlodge	26,754*	434*	15,327
Flathead	152,511	201,008	320,468
Gallatin	229,189*	78,285*	35,268
Garnets	13,833	21,684	59,470
Helena	309,579*	85,261*	116,120
Kootenai	24,576	42,921*	39,796
Lewis and Clark	336,229*	31,339	71,603
Lolo	70,746	64,817*	82,636
Blackfeet IR	28,598	6,794	3,407
Crow IR	★	0	1,347
Flathead IR	20,472	868	17
Fort Belknap IR	242	1,471	0
No. Cheyenne IR	★	0	0
Rocky Boy's IR	14,523	1,973	207
Glacier NP	151,568	29,251	68,728
Yellowstone NP[1]	0	2,269	1,825
Total	**1,490,753**	**597,561**	**878,061**

★ = Not surveyed * = Partially surveyed

[1]Yellowstone NP includes MT, ID, and WY acres

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COMMON AND SCIENTIFIC NAMES

Common Name	Pathogens	Primary Hosts
Annosus root disease		
(S-Type)	*Heterobasidion occidentale* Otrosina & Garbelotto	DF, GF, SAF
(P-Type)	*Heterobasidion irregulare* Garbelotto & Otrosina	PP
Armillaria root disease	*Armillaria ostoyae* (Romagn.) Herink	DF, GF, SAF, saplings of all conifers
Aspen heart rot	*Phellinus tremulae* (Bond.) Bond. & Borisov.	QA
Aspen shoot blight	*Venturia macularis* (Fr.) E. Muller & Arx	QA
Atropellis canker	*Atropellis piniphila* (Weir) Lohman & Cash	LPP
Black canker	*Ceratocystis fimbriata* Ellis & Halst.	QA
Black stain root disease	*Ophiostoma wageneri (*Goheen & F.W. Cobb) Harrington	DF, PP
Comandra rust	*Cronartium comandrae* Pk.	LPP, PP
Diplodia shoot blight	*Diplodia pinea (*Desmaz.) J. Kickx fil.	PP
Dothistroma needle blight	*Mycosphaerella pini* Rost. In Munk	PP, LPP, LP
Dutch Elm Disease	*Ophiostoma ulmi (*Buisman) Nannf.	Elms
Dwarf mistletoes	*Arceuthobium* spp.	DF, LP, LPP, WL
Elytroderma needle disease	*Elytroderma deformans* (Weir) Darker	PP
Ganoderma	*Ganoderma applanatum* (Pers.) Pat.	QA
Indian paint fungus	*Echinodontium tinctorium* (Ell. & Ev.) Ell. & Ev.	GF, WH
Laminated root rot	*Phellinus weirii* (Murrill) R.L. Gilbertson.	DF, GF, SAF, WH
Larch needle blight	*Hypodermella laricis* Tub.	WL
Larch needle cast	*Meria laricis* Vuill.	WL
Marsonnina leaf spot	*Marsonnina populi* (Lib.) Magn.	QA
Red ray rot	*Dichomitus squalens* (P. Karst.) D.A. Reid	PP
Red ring rot	*Phellinus pini* (Thore :Fr.) A.Ames	DF, ES, PP, WL
Rhabdocline needle blight	*Rhabdocline pseudotsugae* Syd.	DF
Schweinitzii root and butt rot	*Phaeolus schweinitzii* (Fr. :Fr.) Pat.	Mainly DF, all conifers
Spruce broom rust	*Chrysomyxa arctostaphyli* Diet.	ES
Tomentosus root disease	*Onnia tomentosa* (Fr.) P. Karst.	ES, DF, LPP, SAF, WL
Western gall rust	*Endocronartium harknessii* (J.P. Moore) Y. Hiratsuka	PP, LPP
White pine blister rust	*Cronartium ribicola* J.C. Fisch.	LP, WBP, WWP

Common Name	Insects	Primary Hosts
Balsam woolly adelgid	*Adelges piceae* Ratzeburg	GF, SAF
Douglas-fir beetle	*Dendroctonus pseudotusugae* Hopkins	DF
Douglas-fir tussock moth	*Orygia pseudotsugata (*McDunnough*)*	DF, ES, TF
Fall webworm	*Hyphantria cunea* (Drury)	CC
Fir engraver beetle	*Scolytis ventralis* LeConte	GF, SAF
Larch casebearer	*Coleophora laricella (*Hubner*)*	WL
Mountain pine beetle	*Dendroctonus ponderosae* Hopkins	All pines
Pine butterfly	*Neophasia menapia* (Felder & Felder)	PP
Pine engraver beetle	*Ips pini* (Say)	LPP, PP
Spruce beetle	*Dendroctonus rufipennis* Swaine	ES
Western balsam bark beetle	*Dryocoetes confuses* Swaine	SAF
Western pine beetle	*Dendroctonus brevicomis* LeConte	PP
Western spruce budworm	*Choristoneura occidentalis* Freeman	DF, GF, SAF, ES, WL

CC = chokecherry; DF = Douglas-fir; ES = Engelmann spruce; GF = grand fir; LP = limber pine; LPP = lodgepole pine; PP = ponderosa pine; QA = quaking aspen; SAF = subalpine fir; TF = true firs; WWP = western white pine; WH = western hemlock; WL = western larch; WBP = whitebark pine

DIRECTORY OF PERSONNEL

Montana Department of Natural Resources and Conservation Phone: (406) 542-4300

Name	Job	Email	Phone number
Bob Harrington	State Forester	bharrington@mt.gov	(406) 542-4301
Paula Short	Chief, Service Forestry Bureau	pshort@mt.gov	(406) 542-4303
Amy Gannon	Forest Pest Management Specialist	agannon@mt.gov	(406) 542-4283
Brennan Ferguson	Forest Pathologist	baferguson@mt.gov	(406) 542-4330

Montana Department of Natural Resources and Conservation, Forestry Division
2705 Spurgin Road, Missoula, Montana 59804

USDA Forest Service Regional Office Phone: (406) 329-3277

Name	Job	Email	Phone number
Mike Dudley[1]	Director, S&PF	mdudley@fs.fed.us	(801) 625-5253
John Shannon	Deputy Director, S&PF	jtshannon@fs.fed.us	(406) 329-3280
Rob Cruz [1]	Forest Health Monitoring Coordinator	rcruz@fs.fed.us	(801) 625-5162
Todd Neel	Pesticide Use Coordinator	toddaneel@fs.fed.us	(406) 329-3133

USDA Forest Service, Northern Region, Federal Building,
200 East Broadway, P.O. Box 7669, Missoula, Montana 59807

[1] USDA Forest Service, Intermountain Region
324 25th Street, Ogden, UT 84401

USDA Forest Service Missoula Field Office Phone*:* (406) 329-3277

Name	Job	Email	Phone number
Gregg DeNitto	Group Leader	gdenitto@fs.fed.us	(406) 329-3637
Mark Casey	Bio. Sci. Tech., Aerial Surveyor	mcasey@fs.fed.us	(406) 329-3136
Chris Hayes	Bio. Sci. Tech., Aerial Surveyor	cjhayes@fs.fed.us	(406) 329-3130
Joel Egan	Entomologist	jegan@fs.fed.us	(406) 329-3278
Marcus Jackson	Plant Pathologist	mbjackson@fs.fed.us	(406) 329-3282
Blakey Lockman	Plant Pathologist	blockman@fs.fed.us	(406) 329-3189
Scott Sontag	Bio. Sci. Tech., Aerial Surveyor	ssontag@fs.fed.us	(406) 329-3323
Brytten Steed	Entomologist	bsteed@fs.fed.us	(406) 329-3142
Nancy Sturdevant	Entomologist	nsturdevant@fs.fed.us	(406) 329-3281

USDA Forest Service, Northern Region, Federal Building,
200 East Broadway, P.O. Box 7669, Missoula, Montana 59807

Figure 1. Reporting Area Boundaries and National Forest Lands in Montana

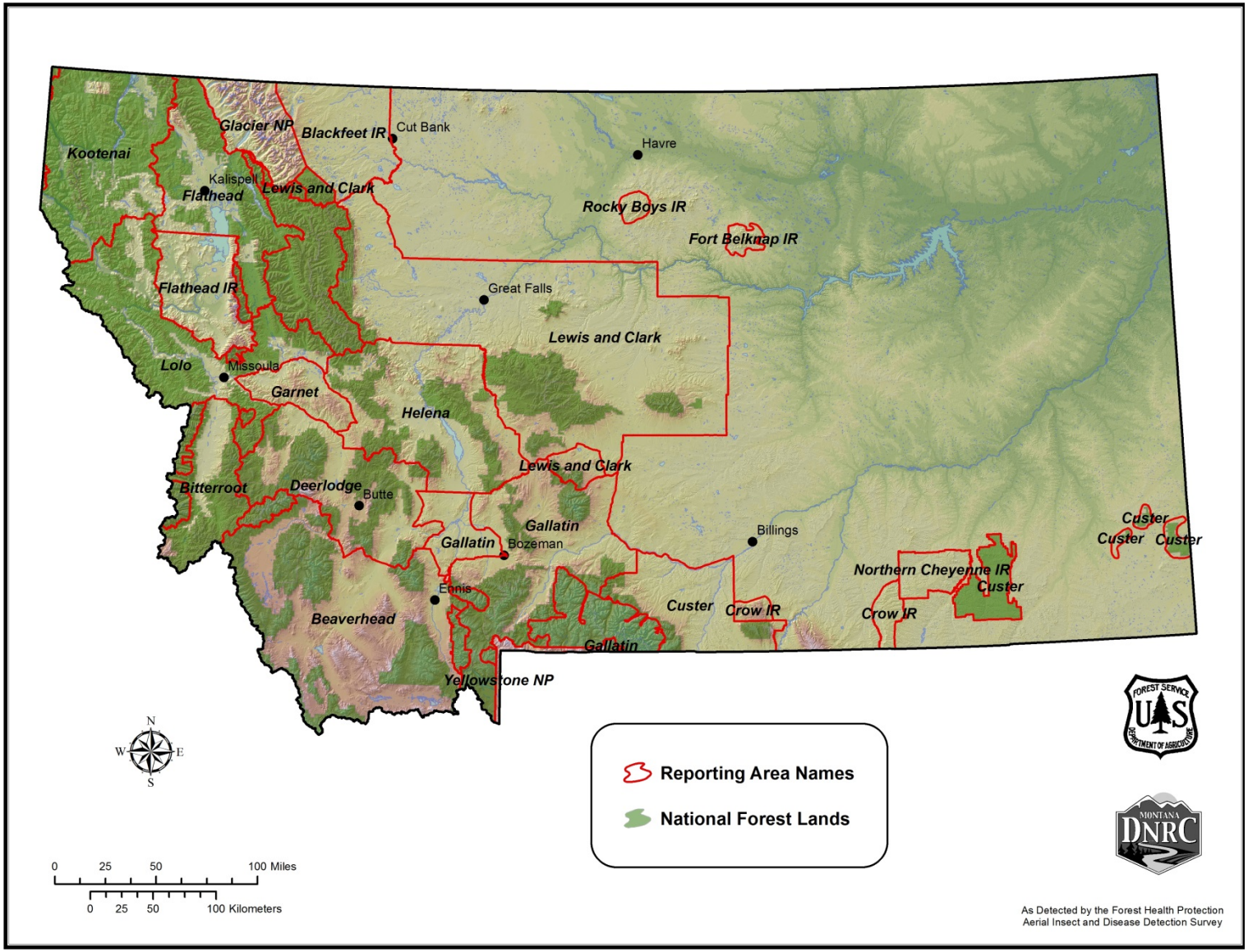

Figure 2. Areas Surveyed in 2014 by Forest Health Protection Aerial Detection Survey in Montana

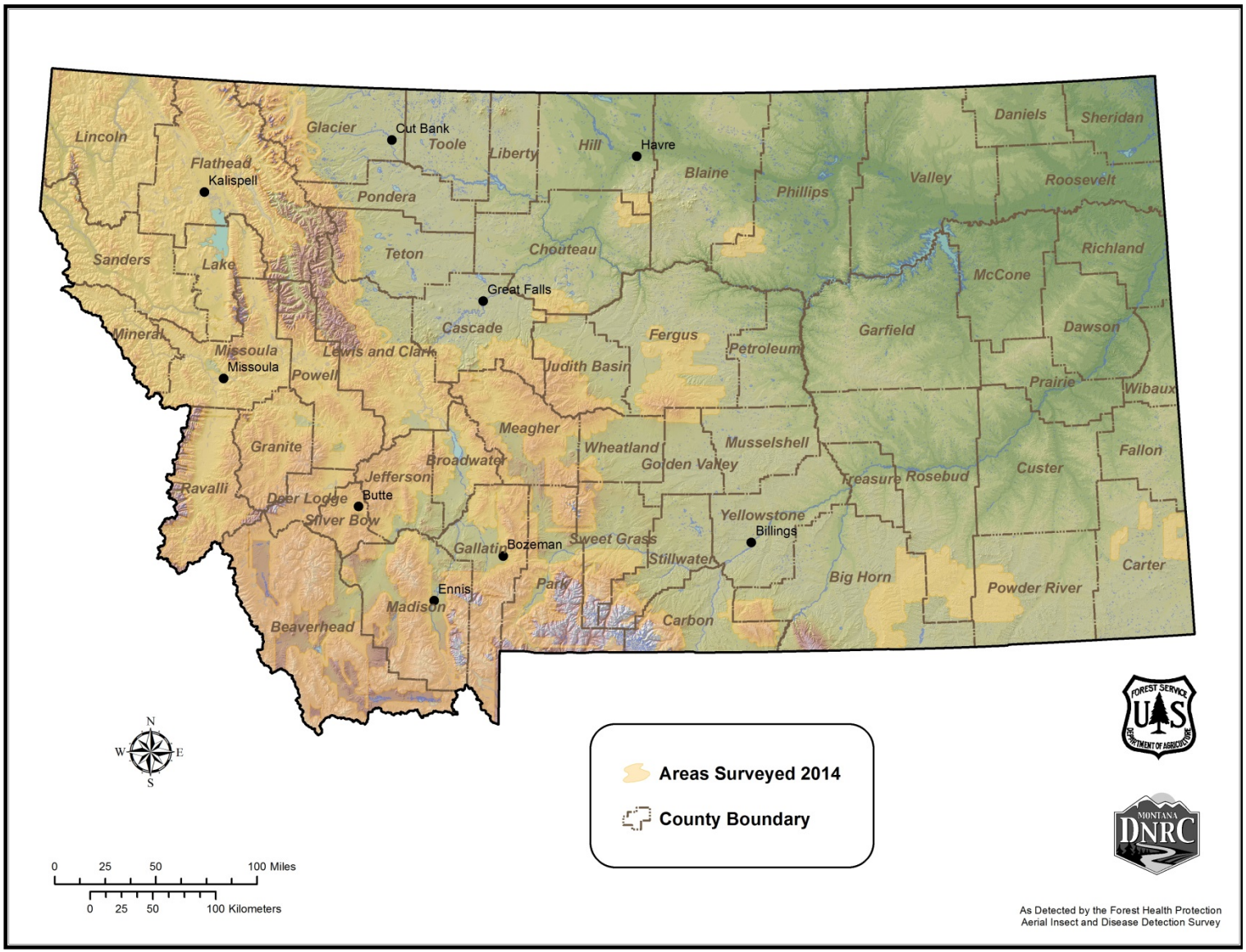

Figure 3. 2014 Mountain Pine Beetle Infestations in Montana

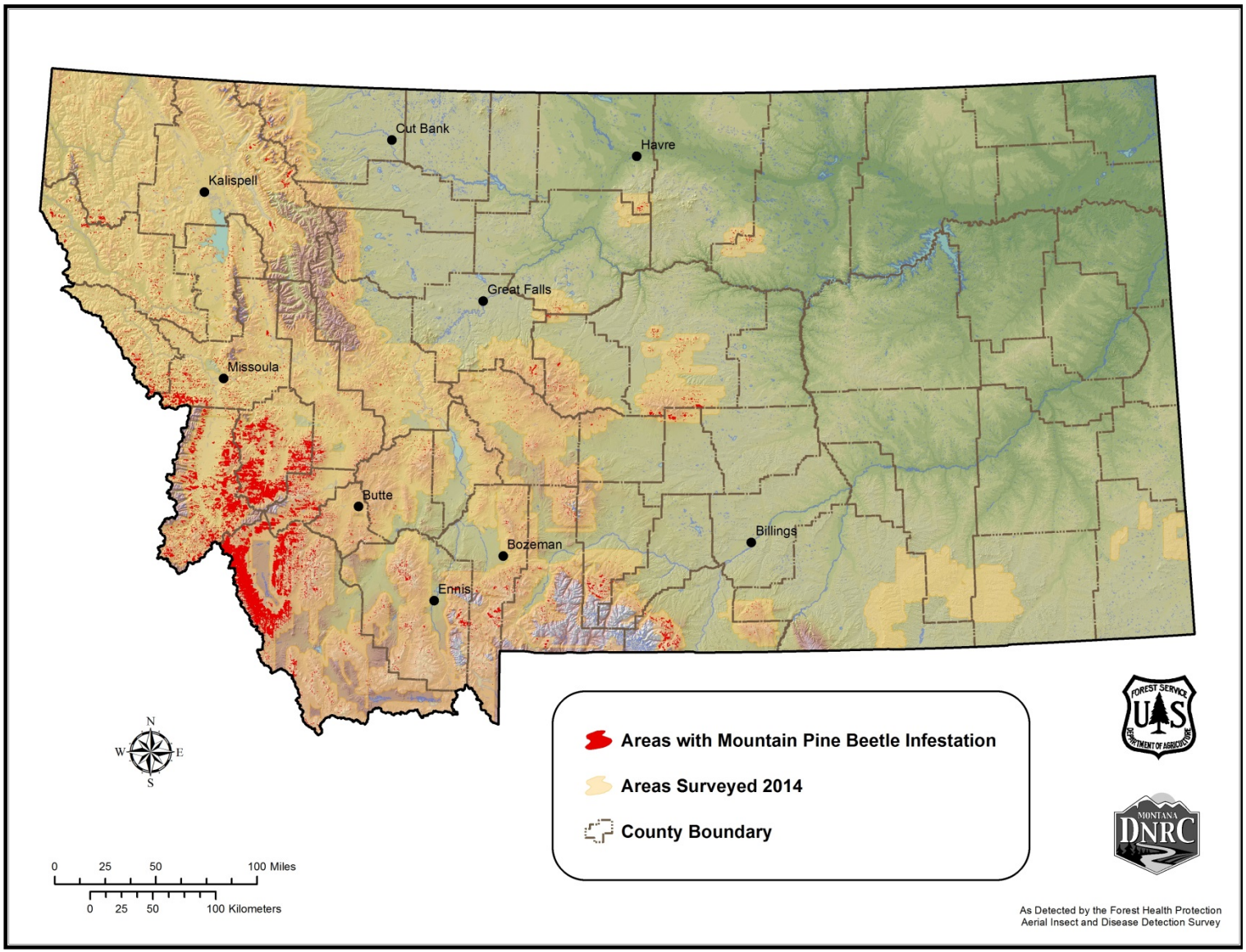

Figure 4. 2014 Douglas-fir Beetle Infestations in Montana

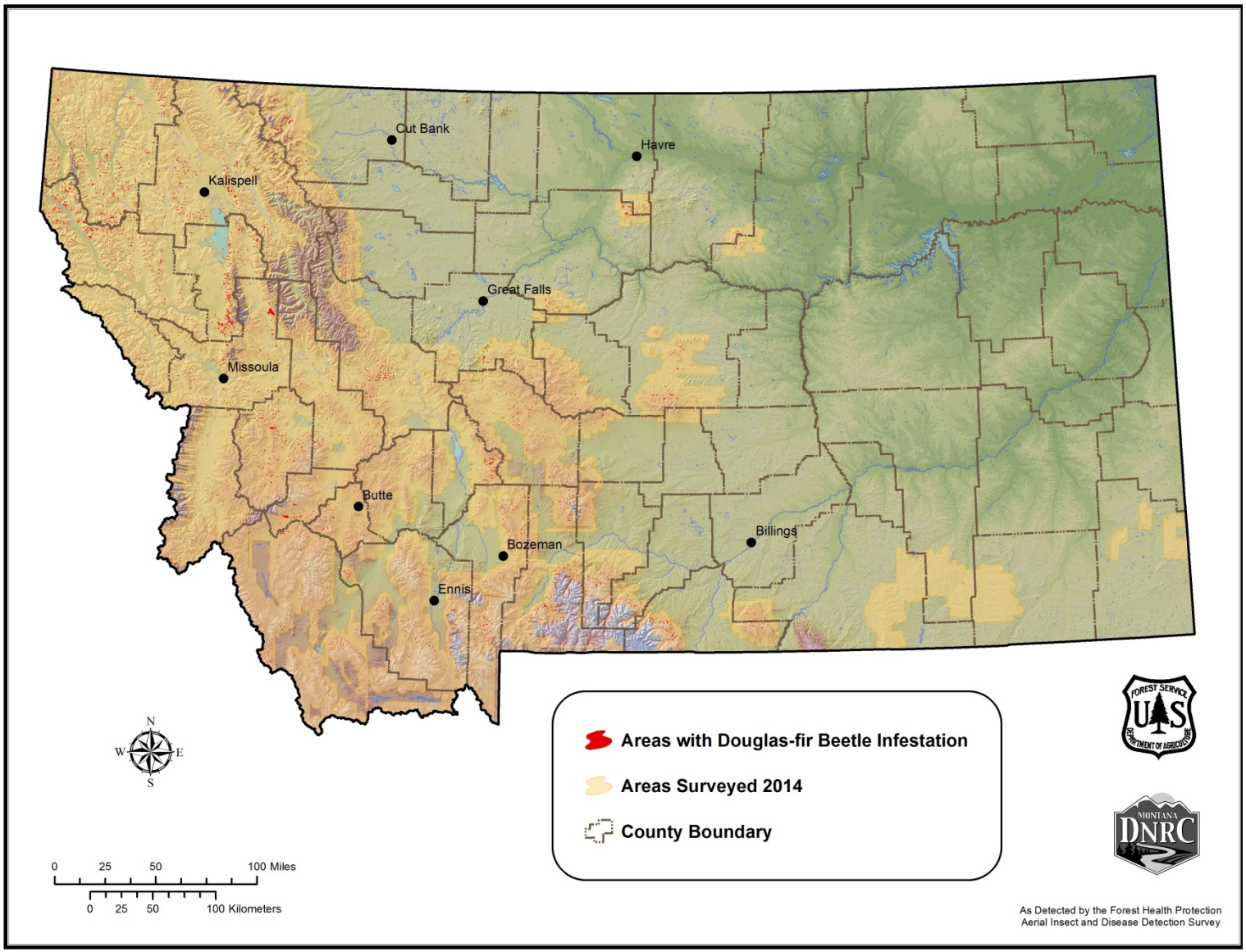

Figure 5. 2014 Fir Engraver Beetle Infestations in Montana

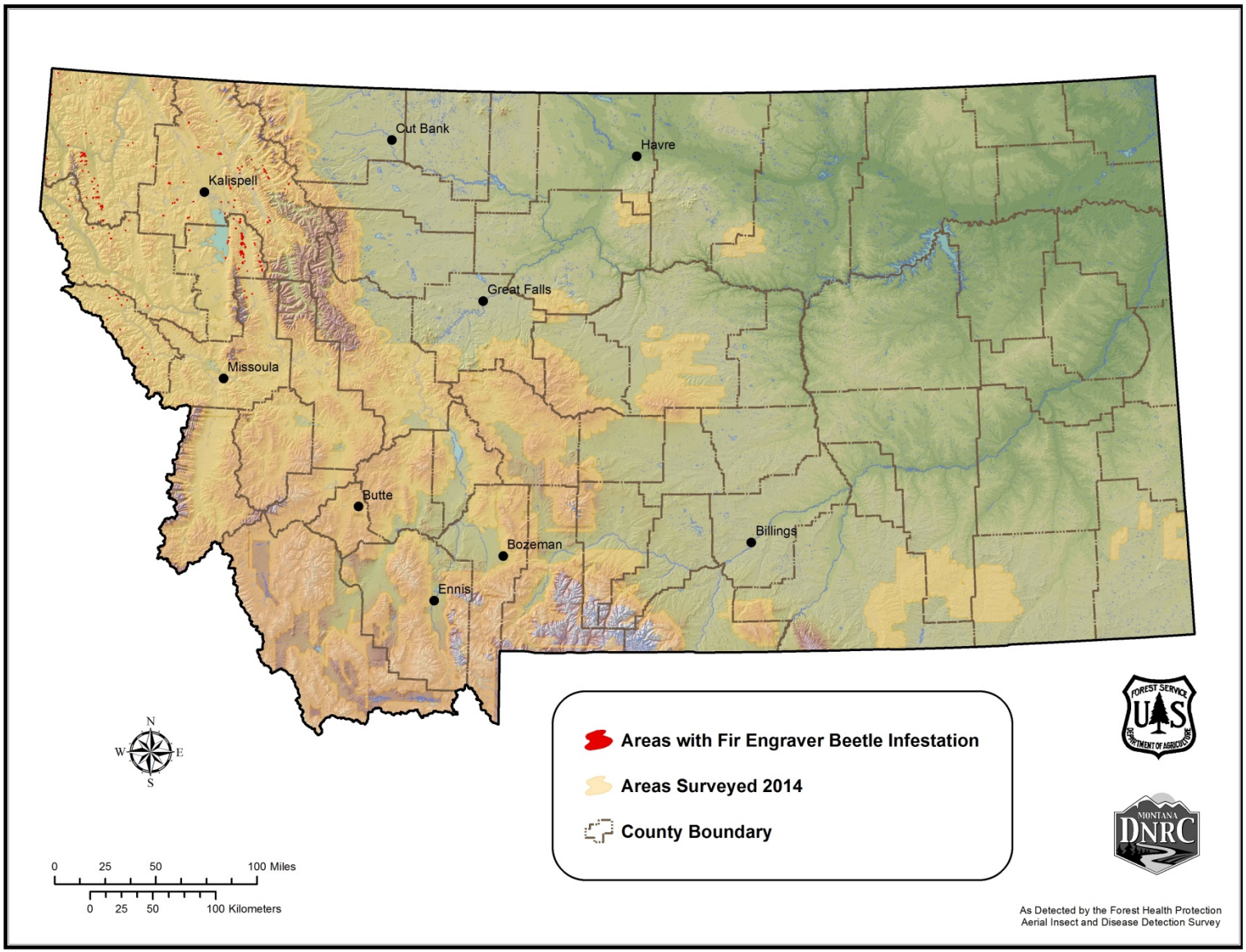

Figure 6. 2014 Subalpine Fir Mortality Complex in Montana

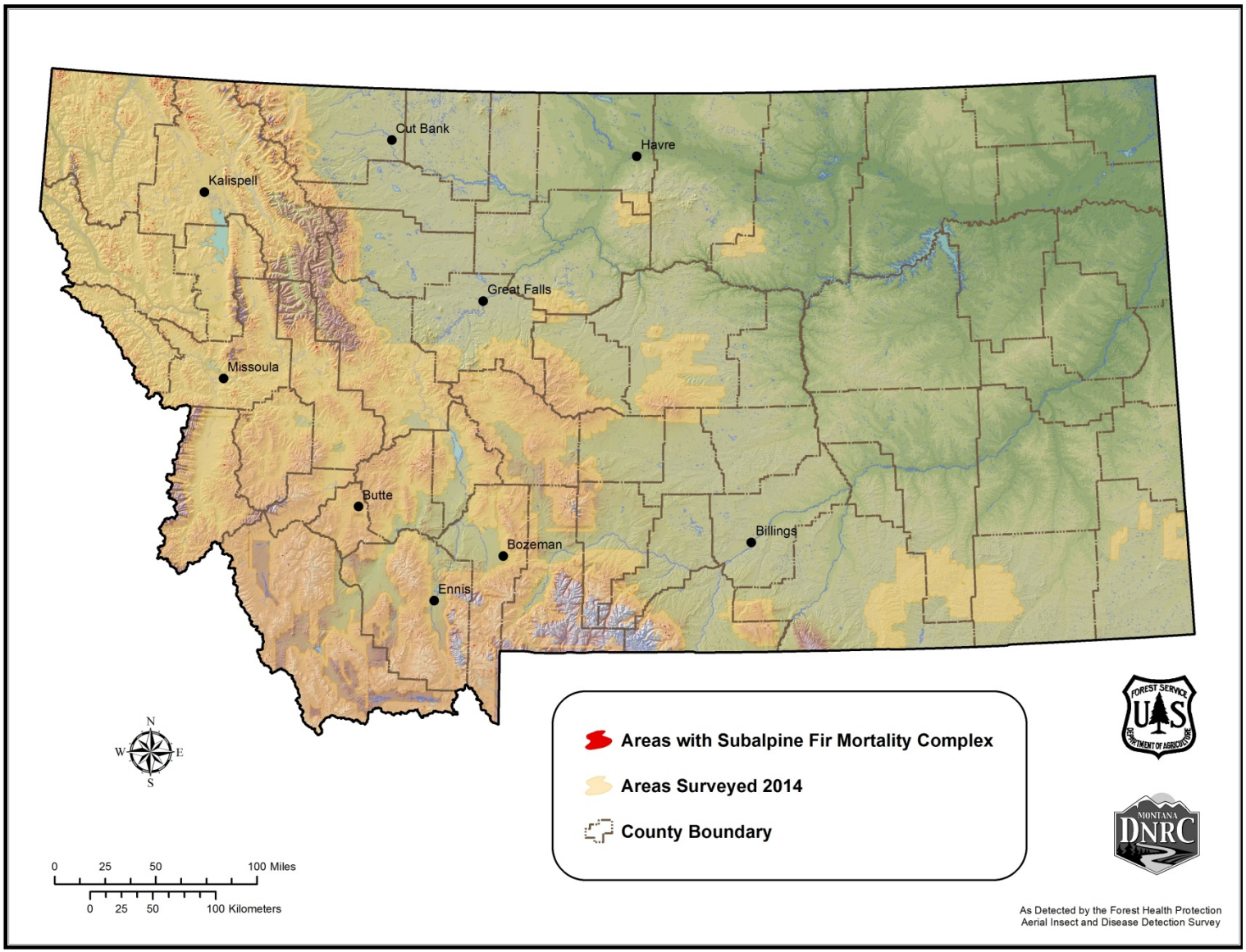

Figure 7. 2014 Western Spruce Budworm Infestations in Montana

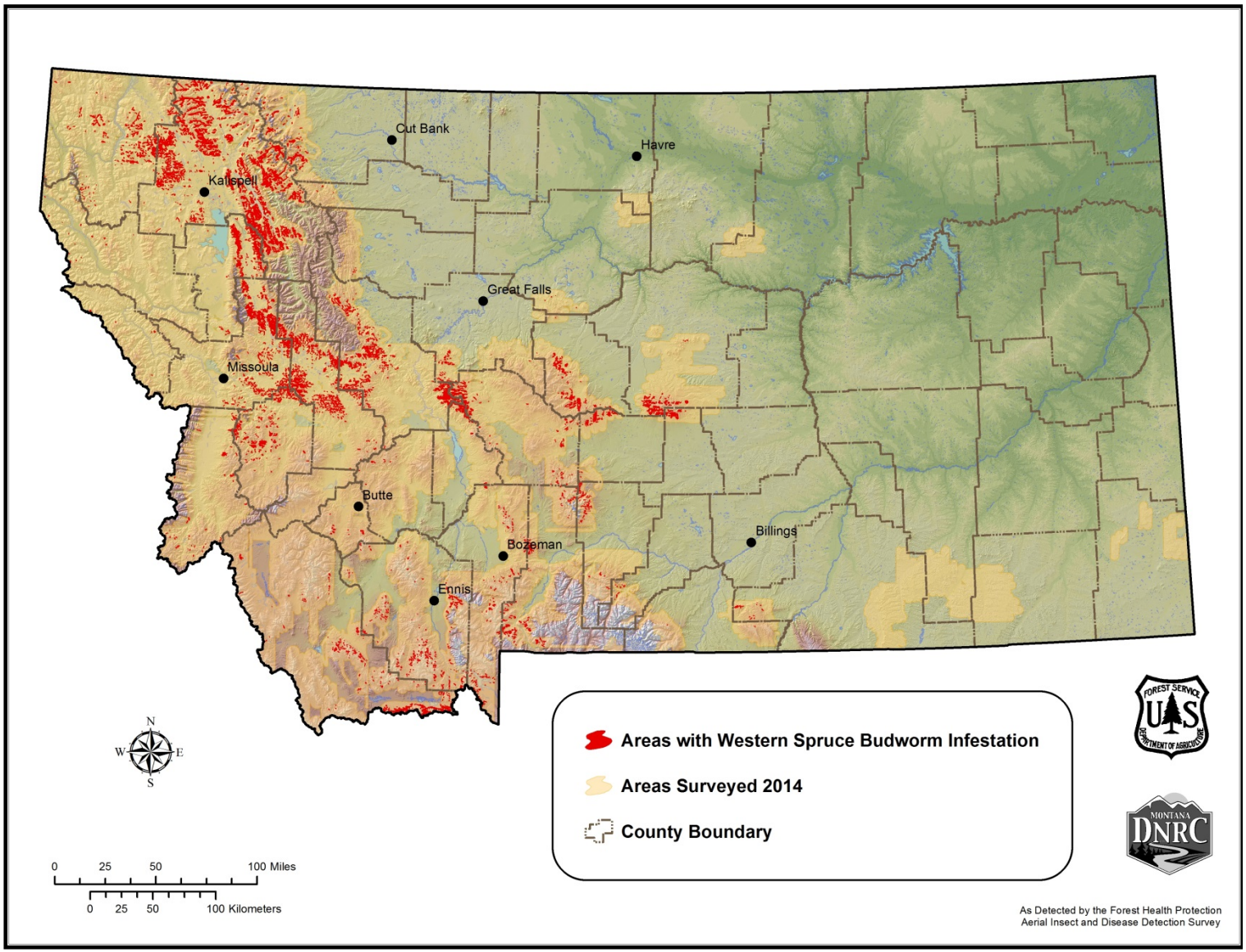

Figure 8. Balsam Woolly Adelgid Detection in Montana, 2010-2013 Ground Survey